

EPA Superfund
Record of Decision:

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PHASE I FOCUSED ON A LEACHATE STREAM THAT RAN OFFSITE TOWARDS BALD EAGLE CREEK. FOLLOWING COMPLETION OF THE PHASE I RI/FS IN 1984, A RECORD OF DECISION (ROD) WAS SIGNED AND LED TO REMEDIATION OF THE LEACHATE STREAM. THE REMEDIATION INVOLVED COVERING THE UPPER REACHES OF THE STREAM WITH NATURAL SOILS AND A CLAY CAP AND INSTALLING A CONDUIT DRAIN FROM THE SITE TO BALD EAGLE CREEK. CONTAMINATED SEDIMENTS THAT WERE EXCAVATED FROM THE AREA WERE PLACED ONSITE IN A TEMPORARY STORAGE IMPOUNDMENT. THE PHASE I REMEDIATION WAS COMPLETED IN 1987.

THE PHASE II RI/FS WAS DIVIDED INTO TWO OPERABLE UNITS, ONE ADDRESSING ONSITE BUILDINGS AND SURFACE FEATURES, AND THE OTHER ADDRESSING SOILS, SLUDGES, AND GROUNDWATER. HOWEVER ONLY THE FIRST UNIT LEAD TO AN AGENCY DECISION. THE PHASE II RI/FS CONCLUDED THAT BUILDINGS AND OTHER SURFACE FEATURES ONSITE WERE CONTAMINATED AND REQUIRED REMEDIATION. BASED ON THE PHASE II RI/FS, THE PHASE II ROD WAS SIGNED IN MAY 1986. IT RECOMMENDED DRAINING AND REMOVING TWO LINED LAGOONS AND DISPOSING OF THE MATERIALS. THE PHASE II ROD ALSO INCLUDED DEMOLITION OF THE BUILDINGS AND TANKS FOR DISPOSAL IN AN OFFSITE LANDFILL. THE PHASE II SITE REMEDIATION WORK IS CURRENTLY UNDERWAY. IN 1986, NO DECISION WAS MADE FOR REMEDIATION OF THE SOIL, SLUDGES, AND GROUNDWATER AND THIS BECAME THE FOCUS OF THIS PHASE III RI/FS AND ROD.

#PSA

PHYSICAL CHARACTERISTICS OF STUDY AREA

SURFACE FEATURES

AT LEAST THREE BACKFILLED SLUDGE LAGOONS ARE PRESENT AT THE DRAKE CHEMICAL SITE AS SHOWN ON FIGURE 2. IN ADDITION, SLUDGE WAS FOUND IN THE AREA SOUTH OF THE FORMER OFFICE TRAILER AND DECONTAMINATION PAD. THE GROUND SURFACE REFLECTS THE EXTENT OF THE THREE LAGOONS, WHEREAS THE AREA NEAR THE TRAILER AND BUILDING NO 1 HAS NO SURFACE EXPRESSION TO INDICATE LATERAL EXTENT OF THE SLUDGE MATERIAL.

A SLOW, BUT CONTINUOUS LEACHATE SEEP WAS OBSERVED AT THE BASE OF THE DIKE NEAR THE SOUTHEAST CORNER OF THE EAST LAGOON (SEE FIGURE 2). THE LEACHATE INFILTRATED THE GROUND APPROXIMATELY 10 FEET FROM THE SEEP, LEAVING SURFACE STAINS ALONG A LINEAR FLOW PATH, UP TO THE POINT OF INFILTRATION.

THE LEACHATE LAGOON AT THE SOUTHERN TIP OF THE SITE CONTAINS WATER TO AN APPROXIMATE DEPTH OF 5 FEET. THE OTHER UNLINED LAGOONS WERE DRY THROUGHOUT THE FIELD INVESTIGATION FROM OCTOBER 1987 TO JANUARY 1988.

SURFACE WATER

OFFSITE SURFACE WATER INCLUDES BALD EAGLE CREEK, SOUTH OF THE SITE, AND THE WEST BRANCH OF THE SUSQUEHANNA RIVER, NORTH OF THE SITE. THREE OF THE LAGOONS ONSITE ALSO CONTAINED WATER AND WERE INCLUDED IN THE FIELD SAMPLING ACTIVITIES.

A TOTAL OF 13 SURFACE WATER AND SEDIMENT SAMPLE PAIRS WERE COLLECTED FROM SURFACE WATER BODIES DURING THE PHASE III FIELD INVESTIGATIONS. THESE LOCATIONS ARE SHOWN ON FIGURE 3.

BOTH BALD EAGLE CREEK AND THE WEST BRANCH OF THE SUSQUEHANNA RIVER ARE CLEARLY WETLAND AREAS AND ARE USED FOR RECREATION AND FISHING. THE THREE ON SITE LAGOONS WERE NOT CONSIDERED AS WETLANDS. AN EXAMINATION OF AERIAL PHOTOGRAPHS FROM ENVIRONMENTAL PHOTOGRAPHIC INTERPRETATION CENTER (EPIC) REVEALS THAT THE THREE ONSITE SURFACE WATER BODIES WERE CONSTRUCTED DURING THE LATE 50'S PROBABLY AS WASTE IMPOUNDMENTS. THE SHAPE OF THE IMPOUNDMENTS HAS CHANGED AS FILL MATERIAL WAS ADDED TO DISPLACE THEIR CONTENTS.

THERE IS NO KNOWLEDGE OF AQUATIC SPECIES HABITATING THESE IMPOUNDMENTS. THE TWO LINED IMPOUNDMENTS CLEARLY DO NOT SUPPORT ANY TERRESTRIAL FLORA. FLORA SURROUNDING THE UNLINED LEACHATE LAGOON IS TYPICAL OF THE SURROUNDING AREA.

THE WATER AND THE SEDIMENTS WITHIN THE TWO LINED IMPOUNDMENTS ARE HIGHLY CONTAMINATED BY SITE RELATED ORGANIC AND INORGANIC CONTAMINANTS. THE LEACHATE LAGOON AT THE SOUTH END OF THE SITE IS THE TOPOGRAPHICAL LOW AND IS FELT TO BE THE RECIPIENT OF ALL PRECIPITATION NOT LOST TO INFILTRATION OR EVAPORATION.

SOILS AND OVERBURDEN MATERIAL

THE ALLUVIAL DEPOSITS WHICH UNDERLIE THE SITE AND ADJACENT AREAS CONSIST OF CLAY TO SANDY CLAY FLOODPLAIN DEPOSITS. THESE COARSEN IN GRAIN SIZE AT DEPTH TO SAND AND GRAVEL STREAM CHANNEL DEPOSITS, THEN FINALLY TO MEDIUM TO COARSE GRAINED SANDS MIXED WITH GRAVEL-SIZED SANDSTONE FRAGMENTS. THE CLAY AND SANDY CLAY LAYER OCCURS FROM GROUND SURFACE TO AN AVERAGE DEPTH OF 15 FEET, BASED ON BOTH ONSITE AND OFFSITE SOIL BORINGS THROUGHOUT THE STUDY AREA. THIS CLAY-RICH LAYER VARIES Laterally THROUGHOUT THE STUDY AREA FROM BROWN AND GRAY SANDY CLAY TO AN ALMOST PURE CLAY LENSE, COLORED GRAY WITH ORANGE MOTTLING. BASED ON THE NEW AND EXISTING DATA, THE GENERAL LITHOLOGY OF THE UPPER 15 FEET OF OVERBURDEN MATERIAL INTERRELATED AS FLOODPLAIN DEPOSITS, MAY BE THOUGHT OF AS A LAYER OF SANDY CLAY WITH VARIOUS LENSES OF CLAY DISPERSED THROUGHOUT.

BELOW APPROXIMATELY 15 FEET, THE ALLUVIAL SEDIMENTS INCREASE IN GRAIN SIZE WITH INCREASING DEPTH TO SAND AND GRAVEL AND THEN TO SAND WITH GRAVEL AND COBBLE-SIZED SANDSTONE FRAGMENTS. THESE SANDSTONE FRAGMENTS MAY HAVE ORIGINATED FROM THE ADJACENT BALD EAGLE MOUNTAIN.

BURIED CHANNEL

BASED ON THE PHASE II AND PHASE III RIS, THERE IS A BURIED ALLUVIAL CHANNEL ORIENTED IN AN EAST-WEST DIRECTION PARALLELING BALD EAGLE CREEK. THE SEDIMENT WITHIN THE EROSIONAL CHANNEL CONTAINS QUARTZ AND FELDSPAR GRAVEL, WHICH IS UNIQUE TO THE AREA. THE QUARTZ AND FELDSPAR GRAVEL INFER AN IGNEOUS SOURCE MATERIAL THAT IS NOT COMMON TO THE AREA BEDROCK. THIS GRAVEL MAY BE GLACIOFLUVIAL IN ORIGIN.

BEDROCK

THE STUDY AREA IS SITUATED ON THE NORTH LIMB OF A NORTHEAST TRENDING ANTICLINE THAT IS PART OF THE VALLEY AND RIDGE PHYSIOGRAPHIC PROVINCE. THE WEST BRANCH VALLEY IS THE RESULT OF DIFFERENTIAL EROSION OF NON-RESISTANT SEDIMENTARY ROCK UNITS (I.E. SHALE, CLAYSTONE, LIMESTONE). THE UNDERLYING BEDROCK THROUGHOUT THE DRAKE CHEMICAL SITE STUDY AREA HAS A REGIONAL DIP OF 20 DEGREES TO 50 DEGREES TO THE NORTHWEST (VENDEL ENVIRO-INDUSTRIAL CONSULTANTS, INC., 1987).

ACCORDING TO A LOCAL STUDY PERFORMED BY THE U.S. ARMY CORPS OF ENGINEERS, THE DRAKE CHEMICAL SITE IS UNDERLAIN BY SHALES OF THE MARCELLAS FORMATION.

SIX BEDROCK WELLS WERE DRILLED AND INSTALLED DURING THE PHASE III RI FIELD INVESTIGATION TO FURTHER INVESTIGATE GROUNDWATER CONDITIONS WITHIN BEDROCK. THE BEDROCK IS A SOFT GRAY CLAYSTONE TO SHALEY CLAYSTONE AND MEDIUM HARD LIMESTONE RANGING FROM LESS THAN 1 FOOT TO MORE THAN 10 FEET IN THICKNESS OCCUR FROM A DEPTH OF 110 FEET (ONSET OF ROCK CORING OPERATIONS) TO THE TOTAL DEPTH OF THE BORING AT 141 FEET BELOW GROUND SURFACE. THIS 31-FOOT INTERVAL RANGES FROM VERY BROKEN TO BLOCKY IN THE ALTERNATING SEQUENCES OF CLAYSTONE AND LIMESTONE. PORTIONS OF THE BLOCKY LIMESTONE REVEAL FORMER HIGHLY FRACTURED ZONES BOUND WITHIN A SECONDARY, CALCITE-CEMENT MATRIX. BASED ON ROCK CORE DATA, THE KEYSER/OLDPORT LIMESTONE FORMATION CONTAINS A VARIETY OF LITHOLOGIES THROUGHOUT THE STUDY AREA.

HYDROGEOLOGY

GROUNDWATER FLOWS NORTH, EAST, AND SOUTH FROM THE DRAKE CHEMICAL SITE, THEN GRADUALLY HEADS TO THE SOUTH AND SOUTHEAST TOWARD BALD EAGLE CREEK, BASED ON THE JANUARY 1988 WATER LEVEL ELEVATIONS TAKEN FROM NEW AND EXISTING MONITORING WELLS SCREENED AT OR NEAR THE WATER TABLE.

AN ANALYSIS OF THE FLOW PATTERNS BASED SOLELY ON THE MONITORING WELLS SCREENED IN BEDROCK SHOWS A LESS DETAILED BUT SIMILAR GROUNDWATER FLOW DIRECTION. THE BURIED CHANNEL APPARENTLY DOES NOT AFFECT OR INFLUENCE GROUNDWATER FLOW DIRECTION OR CONTAMINANT MIGRATION.

THERE IS NO INDICATION OF A VERTICAL HYDRAULIC GRADIENT, ALTHOUGH THERE ARE MINOR DIFFERENCES IN WATER LEVEL ELEVATIONS WITHIN WELL CLUSTERS THAT ARE SCREENED IN VARIOUS LITHOLOGIES AND AT DIFFERENT DEPTHS. REGARDLESS, NO SET PATTERN IS OBSERVED.

FIELD ACTIVITIES

FORTY-ONE TEST PITS WERE EXCAVATED DURING THE FIELD INVESTIGATION TO COLLECT INFORMATION NECESSARY TO CHARACTERIZE THE CONTAMINATED SOILS AND SLUDGES ACCORDING TO CONTAMINANT TYPE AND CONCENTRATION, MASS-VOLUME, AND PHYSICAL LOCATION. EACH TEST PIT WAS EXCAVATED TO THE WATER TABLE OR A MAXIMUM OF 15 FEET. THE PITS WERE LOCATED AS NEAR TO THE PROPOSED 100-FOOT BY 100-FOOT GRID SPACING AS POSSIBLE, ALTHOUGH MINOR ADJUSTMENTS WERE MADE. FIGURE 4 DEPICTS THE 41 TEST PIT LOCATIONS. THIRTY-TWO OF THE TEST PITS WERE LOCATED WITHIN THE FENCED AREA OF THE DRAKE CHEMICAL SITE AND NINE TEST PITS WERE SITUATED ON THE GORHAM PROPERTY, IMMEDIATELY NORTHEAST OF THE FORMER DRAKE FACILITY. IN ADDITION, SIX TEST BORINGS WERE DRILLED ADJACENT TO AREAS WHERE THE EXCAVATION OF TEST PITS WAS DIFFICULT BECAUSE OF SIDEWALL COLLAPSE. A TOTAL OF 28 BORINGS WERE DRILLED AND 22 MONITORING WELLS INSTALLED DURING PHASE III. MONITORING WELL MW-M108 WAS INSTALLED IN ONE OF THE ONSITE TEST BORINGS AND WAS THE ONLY ONSITE WELL INSTALLED DURING THE PHASE III RI. TWO SOIL BORINGS WERE DRILLED OFFSITE TO EXPLORE FOR THE BURIED EROSIONAL CHANNEL WHICH WAS DISCOVERED DURING THE PREVIOUS RI. BOTH BORINGS SUCCESSFULLY LOCATED THE CHANNEL SOIL BORING AND ONE WAS CONVERTED TO MONITORING WELL MW-M125. AN ADDITIONAL 20 SOIL BORINGS AND MONITORING WELLS WERE INSTALLED IN 13 LOCATIONS THROUGHOUT THE STUDY AREA AS SHOWN IN FIGURES 4 & 5. SEVERAL LOCATIONS HAVE WELLS AT DIFFERENT DEPTHS.

OBSERVATIONS FROM TEST PIT OPERATIONS

DURING FIELD OPERATIONS VARIOUS OBSERVATIONS WERE MADE.

- BURIED WASTES WERE IDENTIFIED OUTSIDE THE FENCED PORTION OF THE DRAKE PROPERTY. FOR EXAMPLE:

- ▶ A 6-INCH DRAIN PIPE, UNCOVERED IN TEST PIT NUMBER T-44, WAS TRANSPORTING LEACHATES FROM AN UNKNOWN SOURCE ON DRAKE CHEMICAL SITE OFF SITE TO THE GORHAM PROPERTY.
- ▶ A PARTIALLY BURIED BAG OF A RED SUBSTANCE WAS UNCOVERED NEAR THE WELL CLUSTER NEAR MW-M107.
- ▶ A BLUE PLASTIC BURIED LINER MATERIAL WAS OBSERVED AT ABOUT 11.5 FEET IN SOIL BORING SB-31. DURING DRILLING, THE DRILL WATER WAS DRAINING BENEATH A PARTIALLY BURIED PIECE OF BLUE PLASTIC "LINER" AT THE SURFACE ADJACENT TO THE BORING.
- THREE DISTINCT SLUDGE-FILLED LAGOONS WERE LOCATED. AN AREA OF SOIL COVERED SLUDGE WAS LOCATED JUST SOUTH OF THE DECON PAD IN TEST PIT TP-28. (THIS MAY BE PART OF THE OLD PENNSYLVANIA CANAL.)
- THE SLUDGE APPEARED TO BE LAYERED AS FOLLOWS:
 - ▶ ALTERNATING LAYERS OF CREAM-WHITE AND RED-STAINED MATERIAL THAT WAS SLIGHTLY ODOROUS RANGED FROM VERY VISCOUS TO A HARD CRUST
 - ▶ LESS DISTINCT LAYERING OF DARK BLUE TO GREEN MATERIAL HAD A MORE DISTINCT COLOR AND WAS VISCOUS TO LIQUID.
 - ▶ A BLACK LAYER OF HIGHLY ODOROUS MATERIAL RANGED FROM LIQUID TO VERY LIQUID.
 - ▶ THE SOUTHERN END OF THE SITE CONTAINS BURIED DEBRIS RESEMBLING POSSIBLE FLOOD DEBRIS. THIS AREA SERVED AS A DUMP SITE FOR THE DEBRIS CLEANED UP FOLLOWING THE MAJOR FLOOD THAT TOOK PLACE DURING 1972.

#EOC

EXTENT OF CONTAMINATION

OVERVIEW

SITE ASSOCIATED CONTAMINANTS WERE FOUND THROUGHOUT THE STUDY AREA IN SOIL, SURFACE WATER, SEDIMENT, AND GROUNDWATER SAMPLES. THE DEGREE OF CONTAMINATION, HOWEVER, VARIES THROUGHOUT THE SITE. ANALYSIS OF THE VARIOUS MEDIA DETECTED AN UNUSUALLY LONG LIST OF ORGANIC COMPOUNDS AND METALS. THE ENTIRE LIST IS PRESENTED IN THE RI, BUT A SUMMARY OF THE HIGH AND LOW DETECTION RANGE IS INCLUDED HERE AS TABLE 1. IN GENERAL, THE OCCURRENCE AND CONCENTRATION OF CONTAMINANTS WITHIN A GIVEN MEDIA IS GREATEST ON SITE AND IMMEDIATELY OFF SITE, PARTICULARLY ON THE GORHAM PROPERTY, WHICH IS IN THE DIRECTION OF GROUNDWATER FLOW.

TO FACILITATE THE ASSESSMENT OF THE EXTENT OF GROUNDWATER CONTAMINATION AND TO PROVIDE A BASIS FOR IDENTIFYING THE SCOPE OF GROUNDWATER REMEDIATION STRATEGIES, THE STUDY AREA HAS BEEN DIVIDED INTO THREE ZONES WHICH ARE DEPICTED IN FIGURE 7. ZONE 1 GROUNDWATER IS MORE SEVERELY AFFECTED IMMEDIATELY UNDER THE SITE. CONTAMINATION WAS ALSO DETECTED IN GROUNDWATER SAMPLES TAKEN FROM MONITORING WELLS LOCATED BETWEEN THE PENNSYLVANIA RAILROAD TRACK BED AND THE NORTHERN BERM OF ROUTE 220 (ZONE 2) AND MONITORING WELLS BETWEEN THE SOUTHERN BERM OF ROUTE 220 AND THE BALD EAGLE CREEK (ZONE 3). SITE-RELATED CONTAMINANTS SHOWED A GENERAL ATTENUATING OF CONCENTRATION IN ZONE 2, AS WOULD BE EXPECTED WITH MIGRATION IN THE DIRECTION OF GROUNDWATER FLOW. SOME CONTAMINATION IS PRESENT IN ZONE 3 GROUNDWATER BUT THE EXTENT OF POLLUTION IS LESS THAN THAT FOUND IN ZONES 1 AND 2.

AREA SURFACE WATERS AND SEDIMENT ARE ALSO AFFECTED BY SITE RELATED CONTAMINANTS. THESE MEDIAS ARE MOST LIKELY TO BE AFFECTED BY GROUNDWATER RECHARGE TO SURFACE WATERS, NOT BY AN OVERLOAD FLOW OF CONTAMINANTS. HOWEVER, IT IS PROBABLE THAT SITE RELATED CONTAMINATION MEASURED IN RIVER REACH SEDIMENTS BELOW THE SITE IS LARGELY THROUGH THE FORMER LEACHATE STREAM. CONTAMINANTS OCCURRING UPSTREAM, HOWEVER, MAY BE A RESULT OF REGIONAL FLOODING EVENTS OR FROM INDUSTRIAL APPLICATIONS OF PESTICIDES.

SOILS AND SLUDGES

SITE SOIL IS CONTAMINATED BY VOLATILE ORGANIC COMPOUNDS, BASE/NEUTRAL ACID EXTRACTABLES, FENAC, B-NAPHTHYLAMINE AND INORGANICS. SOME VERY HIGH AND CONSISTENT CONCENTRATIONS OF ORGANICS OF (I.E., FENAC) ARE OBSERVED.

TABLE 1 PRESENTS THE RESULTS OF FIELD SCREENING DATA FOR VOLATILE ORGANIC ANALYSES AND FIXED BASE PHENOLIC ANALYSES OBTAINED FROM SAMPLES TAKEN DURING TEST PITTING ACTIVITIES.

THE FIELD SCREENING REVEALED THAT THE BULK OF THE VADOSE ZONE ON THE SITE IS CONTAMINATED AT VARYING

CONCENTRATIONS BY CHLORINATED SOLVENTS, BENZENE, TOLUENE, XYLENES, AND ETHYLBENZENES. SUBSTITUTED CHLORINATED PHENOLS AND ALKYL PHENOLS ARE ALSO PRESENT.

THESE COMPOUNDS OCCUR THROUGHOUT THE SITE REGARDLESS OF SAMPLING DEPTH; THEREFORE, NO ONE PARTICULAR AREA OF THE SITE OR THE ADJACENT GORHAM PROPERTY CAN BE CONSIDERED A MORE LIKELY SOURCE OF CONTAMINATION TO THE SURROUNDING ENVIRONMENT.

THE SIGNIFICANCE OF THIS FINDING HAS MAJOR IMPLICATIONS FOR SOIL (SOURCE) REMEDIATION STRATEGIES. SINCE CONTAMINANTS ARE HOMOGENEOUSLY DISTRIBUTED THROUGHOUT THE SOILS AND SLUDGES IN THE VADOSE ZONE, THE TOTAL QUANTITY OF MATERIAL REQUIRING TREATMENT WOULD BE APPROXIMATELY 252,000 CUBIC YARDS.

INORGANICS, INCLUDING CYANIDE, MERCURY, NICKEL, LEAD, CHROMIUM, AND CADMIUM, WERE ALSO DETECTED AND MAY OR MAY NOT OCCUR AS A RESULT OF SITE CONTAMINATION. THE COMPOUNDS LEAD, NICKEL, CHROMIUM, BARIUM, ALUMINUM, IRON, MANGANESE, AND MAGNESIUM OCCUR WITH GREATEST FREQUENCY AND IN LARGE CONCENTRATIONS. HEAVY METALS INCLUDING MERCURY AND SELENIUM WERE PRESENT BUT DID NOT OCCUR IN GREAT CONCENTRATIONS OR FREQUENCY.

THE RI INDICATES THAT CADMIUM CLEARLY EXCEEDS EXPECTED RANGES AND IS PROBABLY SITE RELATED. THE CONTRAST IS LESS DRAMATIC FOR COBALT, COPPER, LEAD, AND SILVER; HOWEVER, IT CANNOT BE CONCLUDED THAT THEY ARE NOT RESIDUAL CONTAMINANTS FROM PAST WASTE PRACTICES AT THE SITE.

SURFACE WATERS

RESULTS OF SURFACE WATER SAMPLING AND ANALYSIS FOR OFFSITE SURFACE WATERS IN THE REGIONAL WATER SHED ARE PRESENTED IN TABLE 1. EVIDENCE THAT OFFSITE SURFACE WATERS ARE AFFECTED BY SITE-RELATED CONTAMINATION IS DEMONSTRATED IN SAMPLES COLLECTED DOWNSTREAM OF THE SITE. THE DETECTION OF FENAC IN SAMPLES COLLECTED FROM LOCATIONS 5, 6, AND 7 ON BALD EAGLE CREEK AND LOCATIONS 8, 11, AND 12 ON THE WEST BRANCH SUSQUEHANNA RIVER SUPPORT THIS ASSESSMENT.

SUMMARY OF REPRESENTATIVE CONTAMINANTS TABLE 1
CONCENTRATIONS AND OBSERVATIONS

OBSERVED AT THE DRAKE CHEMICAL SITE
PHASE III RI/FS

MEDIA	COMPOUNDS	CONCENTRATION RANGE	NUMBER OBSERVATIONS
SURFACE WATER	FENAC	0.9 - 4,900 UG/L	7 OF 13
	BENZOIC ACID	36 UG/L	1 OF 13
	2,4-DIMETHYLPHENOL	7 UG/L	1 OF 13
	2,4,5-TRICHLOROPHENOL	6 UG/L	
	NICKEL	16 -35 UG/L	11 OF 13
	SILVER	10-17 UG/L	2 OF 13
	LEAD	16 UG/L	1 OF 13
	CHROMIUM	13 UG/L	1 OF 13
	COBALT	12-25 UG/L	12 OF 13
	ALUMINUM	97-3,910 UG/L	12 OF 13
	BARIUM	36-89 UG/L	13 OF 13
SEDIMENTS	CHLOROBENZENE	2-9,100 UG/L	4 OF 13
	FENAC	24-1,500,000 UG/L	9 OF 13
	TOLUENE	710- UG/KG	1 OF 13
	BENZENE	100 UG/KG	1 OF 13
	1,2-DICHLOROBENZENE	70-8,600	4 OF 13
	1,4-DICHLOROBENZENE	290-140,000 UG/KG	3 OF 13
	1,2,4-TRICHLOROBENZENE	170-140,000 UG/KG	3 OF 13
	TETRACHLOROETHENE	3-47 UG/KG	3 OF 13
	BENZOIC ACID	450-1,800 UG/KG	3 OF 13
	PHENOL	740-2,700 UG/KG	2 OF 13
	TOTAL XYLENES	20,000 UG/KG	1 OF 13
	BENZO(B)FLUORANTHENE	210-100,000 UG/KG	13 OF 13
	BENZO(A)ANTHRACENE	130-1,200 UG/KG	2 OF 13
	NAPHTHALENE	370-43,000 MG/KG	2 OF 13
	ALUMINUM	2,320-35,500 MG/KG	13 OF 13
	BARIUM	47-257 MG/KG	13 OF 13
	CHROMIUM	8.6-69 MG/KG	13 OF 13
	LEAD	13-113 MG/KG	13 OF 13
	MERCURY	290-820 MG/KG	4 OF 13
	NICKEL	12-373 MG/KG	13 OF 13
	CYANIDE	2.4- 766 MG/KG	3 OF 13
	ARSENIC(TOTAL)	5.5-27 MG/KG	10 OF 13
	BENZO(K)FLUORANTHENE	210-3,300 UG/KG	9 OF 13
	FLUORANTHENE	110-3,200 UG/KG	5 OF 13
	PYRENE	150-3,400 UG/KG	4 OF 13
	CHRYSENE	140-2,300 UG/KG	9 OF 13
	BENZO(A)PYRENE	91-1,800 UG/KG	8 OF 13
	PENTACHLOROPHENOL	150-1,200 UG/KG	5 OF 13
SOILS	FENAC	3.8-8,200 UG/KG	32 OF 42
	ETHYLBENZENE	1-27,000 UG/KG	11 OF 42
	TOTAL XYLENES	3-220,000 UG/KG	15 OF 42
	CHLOROBENZENE	2-14,000 UG/KG	24 OF 42
	BENZO(A)ANTHRACENE	100-42,000 UG/KG	15 OF 42
	1,2-DICHLOROBENZENE	200-100,000 UG/KG	10 OF 42
	1,4-DICHLOROBENZENE	190-12,000 UG/KG	12 OF 42
	(TOTAL)ARSENIC	2-21 MG/KG	29 OF 42
	NICKEL	3-41 MG/KG	37 OF 42
	LEAD	3.3-1,170 MG/KG	31 OF 42
	NAPHTHALENE	74-7,000 UG/KG	8 OF 42
	B-NAPHTHYLAMINE	470-1,500,000 UG/KG	18 OF 42

	1,2,4-TRICHLOROBENZENE	98-21,000 UG/KG	8 OF 42
	PENTACHLOROPHENOL	1,200-130,000 UG/KG	3 OF 42
	PHENANTHRENE	120-140,000 UG/KG	6 OF 42
ZONE 1	FENAC	20-20,000 UG/L	12 OF 15
	B-NAPHTHYLAMINE	1-3,000 UG/L	8 OF 15
	ARSENIC (TOTAL)	5.5-400 UG/L	6 OF 15
	BARIUM	28-14,800 UG/L	10 OF 15
	CHROMIUM	10.3-448 UG/L	10 OF 15
	LEAD	15,000-23,700 UG/L	4 OF 15
	MERCURY	0.2- 1 UG/L	4 OF 15
	NICKEL	31.5-424 UG/L	6 OF 15
	SILVER	19 UG/L	1 OF 15
	CYANIDE	10-6,780 UG/L	4 OF 15
	TOLUENE	1.3-8,100 UG/L	10 OF 15
	CHLOROBENZENE	72-18,000 UG/L	12 OF 15
	1,2-DICHLOROETHANE	0.1-5,100 UG/L	14 OF 15
	TRICHLOROETHENE	1.4-500 UG/L	11 OF 15
	1,2-DICHLOROBENZENE	4.7-440 UG/L	8 OF 15
	1,4-DICHLOROBENZENE	3.4-100 UG/L	9 OF 15
ZONE 2	FENAC	7.6-9,200 UG/L	5 OF 13
	B-NAPHTHYLAMINE	12 UG/L	1 OF 13
	CHLOROBENZENE	2.4-11,000 UG/L	6 OF 13
	1,2-DICHLOROETHANE	6.7-6,800 UG	6 OF 13
	TRICHLOROETHANE	23-130 UG/L	3 OF 13
	ARSENIC(TOTAL)	3.9-35.4 UG/L	6 OF 13
	NICKEL	17-260 UG/L	11 OF 13
	CHROMIUM	5-125 UG/L	9 OF 13
	MERCURY	0.3-0.5 UG/L	2 OF 13
	LEAD	49-139 UG/L	4 OF 13
	CADMIUM	4.3-100 UG/L	4 OF 13
ZONE 3	FENAC	0.6-700 UG/L	7 OF 13
	CYANIDE	16 UG/L	1 OF 13
	1,2-DICHLOROETHANE	0.1-950 UG/L	8 OF 13
	CHLOROBENZENE	40 UG/L	1 OF 13
	BARIUM	35-5,390 UG/L	12 OF 13
	CADMIUM	5-34 UG/L	7 OF 13
	COBALT	10-679 UG/L	9 OF 13
	MERCURY	0.2-1.7 UG/L	6 OF 13
	NICKEL	17.6-1,400 UG/L	8 OF 13
	CHROMIUM	9.5-468 UG/L	6 OF 13
	LEAD	1.4-535 UG/L	4 OF 13

EVIDENCE THAT SITE-RELATED CONTAMINANTS OCCUR IN SURFACE WATERS IN THE WATERSHED ABOVE THE SITE (UP GRADIENT) IS ALSO INDICATED. THE SITE SPECIFIC CONTAMINANT DETECTED IN BOTH UPSTREAM SUSQUEHANNA RIVER AND BALD EAGLE CREEK SAMPLES IS FENAC WHICH, BECAUSE OF AREA HYDROLOGY, IS NOT LIKELY TO HAVE OCCURRED FROM SITE DRAINAGE, BUT MAY HAVE OCCURRED FROM REGIONAL FLOODING EVENTS.

INORGANIC COMPOUNDS INCLUDING ALUMINUM, BARIUM, CALCIUM, COBALT, CHROMIUM, IRON, LEAD, NICKEL, POTASSIUM AND SODIUM ARE FOUND AT VARYING CONCENTRATIONS IN SAMPLES TAKEN THROUGHOUT THE AREA BUT, BECAUSE OF THEIR RANDOM DISTRIBUTION INCLUDING UPGRADIENT SAMPLES (LOCATIONS 4 AND 13) AND POSSIBLE NATURAL OCCURRENCE, THEY CANNOT BE ATTRIBUTED SPECIFICALLY TO THE DRAKE CHEMICAL SITE.

SITE SURFACE LAGOONS ARE CONTAMINATED BY INORGANICS, BASE/NEUTRAL ACID EXTRACTABLES AND FENAC. THE OBSERVED, SITE-RELATED CONTAMINATION (I.E., ORGANICS, ESPECIALLY FENAC) IS NOT UNEXPECTED SINCE THE TWO LINED LAGOONS ARE USED FOR THE IMPOUNDMENT OF WASTEWATER FROM THE SITE. CONTAMINATION OBSERVED IN SURFACE WATER FROM THE LEACHATE LAGOON IS ALSO NOT UNEXPECTED. THIS LAGOON IS AT THE TOPOGRAPHICAL LOW POINT OF THE SITE AND IS BELIEVED TO BE THE RECIPIENT OF SURFACE RUNOFF.

SEDIMENTS

THE MOST SIGNIFICANT SITE-RELATED CONTAMINANTS (I.E., FENAC, PHENOL, CHLOROBENZENE, 4-METHYLPHENOL) ARE DETECTED IN SAMPLES TAKEN FROM POINTS THAT ARE PART OF THE NORMAL DOWNSTREAM HYDROLOGIC FLOW PATTERN OF THE WATERSHED AS EXPECTED. THE COMPOUND FENAC IS FOUND IN UPSTREAM SAMPLES AS WELL. ITS OCCURRENCE IN THESE LOCATIONS MAY BE A RESULT OF DELIBERATE APPLICATION FOR PLANT CONTROL PURPOSES AND/OR DISTRIBUTION DURING REGIONAL FLOODING EVENTS. THE OCCURRENCE OF CHLOROBENZENE IN UPSTREAM SEDIMENT SAMPLES SUPPORTS THE ASSESSMENT THAT REGIONAL FLOODING EVENTS WERE PROBABLY MAJOR CONTRIBUTORS TO THE MIGRATION OF SITE-RELATED COMPOUNDS TO UPSTREAM LOCATIONS.

- FENAC, CHLOROBENZENE, AND OTHER SITE-RELATED COMPOUNDS WERE OBSERVED IN UPSTREAM SAMPLES ON BALD EAGLE CREEK AND THE WEST BRANCH, SUSQUEHANNA RIVER.
- FENAC AND CHLOROBENZENE WERE NOT OBSERVED IN THE WEST BRANCH, SUSQUEHANNA RIVER NORTH OF THE SITE ABOVE THE CONFLUENCE.
- ALL SAMPLES CONTAIN VARYING AMOUNTS OF POLYNUCLEAR AROMATIC HYDROCARBONS AND INORGANICS WHICH MAY OR MAY NOT BE ASSOCIATED WITH THE DRAKE CHEMICAL SITE.
- THE COMPOUND PENTACHLOROPHENOL IS FOUND SPORADICALLY THROUGHOUT THE AREA AND IN THREE ONSITE SAMPLES. DUE TO THE OCCURRENCE OF THIS COMPOUND IN THE UPSTREAM SUSQUEHANNA RIVER SEDIMENT AND ITS APPARENT ABSENCE IN DOWNSTREAM BALD EAGLE CREEK SEDIMENTS THE OCCURRENCE OF THE COMPOUND IS NOT BELIEVED TO BE SITE RELATED.

ONSITE SEDIMENT SAMPLES TAKEN FROM THE HOLDING LAGOONS ARE HIGHLY CONTAMINATED BY VOLATILE ORGANICS, FENAC, AND BASE/NEUTRAL ACID EXTRACTABLE COMPOUNDS. AS PREVIOUSLY STATED FOR THE ONSITE SURFACE WATERS, THIS OBSERVATION IS IN AGREEMENT WITH EXPECTATIONS.

GROUNDWATER

VOAS

AS PREVIOUSLY MENTIONED, TO FACILITATE ASSESSMENT OF THE EXTENT OF GROUNDWATER CONTAMINATION AND TO PROVIDE A BASIS FOR IDENTIFYING THE SCOPE OF GROUNDWATER TREATMENT AND REMEDIAL TECHNOLOGIES, THE STUDY AREA HAS BEEN DIVIDED INTO THREE LOGICAL ZONES. ZONES ARE BASED ON PHYSICAL BOUNDARIES AND LEVELS OF CONTAMINATION. FIGURES 5, 6 AND 7 SHOW THE LOCATION OF THE MONITORING WELLS AND THE PHYSICAL BOUNDARIES FOR THESE ZONES.

- ZONE 1 REPRESENTS GROUNDWATER BENEATH THE SITE AND THE GORHAM PROPERTY. GROUNDWATER IN ZONE 1 HAVE BEEN THE MOST SEVERELY IMPACTED.
- ZONE 2 GROUNDWATER INCLUDE THOSE UNDERLYING THE AREA BETWEEN ZONE 1 (I.E., THE SITE) AND STATE ROUTE 220. THIS AREA SOUTH OF THE SITE HAS BEEN LESS SEVERELY IMPACTED BY SITE RELATED CONTAMINATION THAN ZONE 1.
- ZONE 3 GROUNDWATER ARE THOSE SOUTH OF STATE ROUTE 220 TO BALD EAGLE CREEK.

TABLE 1 PRESENTS THE SUMMARY OF THE RESULTS OF VOLATILE ORGANIC COMPOUND ANALYSIS OBTAINED FROM BOTH ROUNDS OF GROUNDWATER SAMPLING ACTIVITIES.

IN GENERAL, SAMPLES TAKEN FROM MONITORING WELLS IN ALL THREE ZONES ARE AFFECTED BY SITE-RELATED CONTAMINANTS.

GROUNDWATER IN THE ZONE 1 AREA IS CHARACTERIZED BY TRICHLOROETHENE, CHLOROBENZENE, ETHYLBENZENE, 1,2-DICHLOROETHANE, 1,2-DICHLOROBENZENE, 1,3-DICHLOROBENZENE, AND 1,4-DICHLOROBENZENE IN VARYING AMOUNTS. THESE COMPOUNDS ARE DETECTED IN THE FIRST AND THE SECOND SAMPLING ROUNDS. IN BOTH CASES CHLOROBENZENE WAS DETECTED WITH THE GREATEST FREQUENCY. SOLVENTS INCLUDING BENZENE, TOLUENE, AND ETHYLBENZENE WERE ALSO DETECTED.

OFFSITE GROUNDWATER TAKEN FROM ZONE 2 MONITORING WELLS DISPLAYS THE SAME CHARACTERISTIC ORGANIC CONTAMINATION. COMPOUNDS, INCLUDING BENZENE, CHLOROBENZENE, 1,2-DICHLOROETHANE, TETRACHLOROETHENE, AND TRICHLOROETHENE ARE PRESENT IN VARYING AMOUNTS.

SAMPLES TAKEN FROM FURTHER DOWNGRAIENT OF ZONE 3 MONITORING WELLS SHOW THAT SITE-RELATED ORGANIC CONTAMINATION IS EXTENDING TOWARD THE BALD EAGLE CREEK. CONSISTENTLY, CHLOROBENZENE WAS DETECTED IN BOTH ROUNDS BUT AT LOWER LEVELS OF CONTAMINATION THAN 1,2-DICHLOROETHANE. THIS OBSERVATION IS CONSISTENT WITH THE EXPECTED CONTAMINANT MIGRATION PATHWAY IN THE DIRECTION OF GROUNDWATER FLOW AND THE INCREASED MOBILITY IN SOILS OF 1,2-DICHLOROETHANE (LOWER KOC AND KOW) OVER CHLOROBENZENE.

BNAS, PESTICIDES/PCBS

TABLE 4 PRESENTS THE RESULTS OF BASE/NEUTRAL-ACID EXTRACTABLES, PESTICIDES, AND PCB ANALYSES OBTAINED FROM THE FIRST AND SECOND ROUNDS OF GROUNDWATER SAMPLING. SAMPLES TAKEN FROM MONITORING WELLS IN ALL THREE ZONES ARE AFFECTED BY SITE-RELATED CONTAMINANTS. NO TCL PESTICIDES OR PCBS WERE DETECTED IN ANY GROUNDWATER SAMPLES COLLECTED THROUGHOUT THE STUDY AREA. THIS OBSERVATION IS CONSISTENT WITH RESULTS OBTAINED FOR THE SOIL/SLUDGES (I.E., SOURCE MATERIALS). GROUNDWATER IN THE ZONE 1 AREA IS CONTAMINATED WITH COMPOUNDS INCLUDING 1,2-DICHLOROBENZENE, 1,3-DICHLOROBENZENE, 1,4-DICHLOROBENZENE, NITROBENZENE, 1,2,4-TRICHLOROBENZENE, PHENOL, AND ALKYL AND CHLORINATED PHENOLICS. THE COMPOUND PHENOL IS DETECTED AT THE HIGHEST LEVEL OF CONTAMINATION; HOWEVER, THE CONCENTRATION IS LOWER THAN THAT FOUND IN ZONE 1 SAMPLES. 2,4-DIMETHYLPHENOL, 1,2-DICHLOROBENZENE, AND 1,4-DICHLOROBENZENE OCCUR WITH GREATEST FREQUENCY IN THE FIRST ROUND OF SAMPLES. NO POSITIVE RESULTS ARE REPORTED IN ZONE 2 SECOND ROUND SAMPLES.

ONLY TWO EXTRACTABLE COMPOUNDS WERE DETECTED IN ZONE 3 MONITORING WELL SAMPLES. BIS(2-ETHYLHEXYL) PHTHALATE WAS DETECTED IN FOUR SAMPLES AT LOW CONCENTRATIONS AND MAY HAVE OCCURRED AS A RESULT OF LABORATORY CONTAMINATION. THE COMPOUND 3,3-DICHLOROBENZIDINE WAS DETECTED IN ONLY ONE SAMPLE AND, SINCE IT IS AN ORGANIC DYE PRECURSOR, MAY BE PRESENT AS A RESULT OF ACTIVITIES AT THE DRAKE CHEMICAL SITE.

THE COMPOUNDS PHENOL AND 4-CHLOROANILINE WERE COMPOUNDS WITH THE HIGHEST CONCENTRATION IN THE FIRST AND SECOND ROUNDS, RESPECTIVELY; HOWEVER, THE FREQUENCY OF OCCURRENCE FOR ANY ONE COMPOUND IS SOMEWHAT INCONCLUSIVE SINCE ALL COMPOUNDS WERE DETECTED IN EITHER ONE OR TWO SAMPLES.

FENAC, B-NAPHTHYLAMINE, CYANIDE

TABLE 1 DISPLAYS THE RESULTS OF ANALYSES FOR FENAC B-NAPHTHYLAMINE AND CYANIDE OBTAINED FROM BOTH THE FIRST AND SECOND ROUNDS OF GROUNDWATER SAMPLING ACTIVITIES.

SAMPLES TAKEN FROM MONITORING WELLS IN ALL THREE ZONES ARE CONTAMINATED BY ONE OR MORE SITE-RELATED CONTAMINANTS. BOTH ROUNDS OF SAMPLING INDICATE THAT ZONE 1 GROUNDWATER IS CONTAMINATED BY BOTH FENAC AND B-NAPHTHYLAMINE. CYANIDE IS DETECTED IN THE FIRST, MORE COMPREHENSIVE SAMPLING ROUND BUT NOT IN THE SECOND ROUND SAMPLES. FENAC WAS DETECTED AT THE HIGHEST LEVEL OF CONTAMINATION AND WITH THE GREATEST FREQUENCY. B-NAPHTHYLAMINE WAS ALSO DETECTED IN SIGNIFICANT AMOUNTS.

FENAC AND B-NAPHTHYLAMINE WERE ALSO DETECTED IN OFFSITE, ZONE 2, MONITORING WELL SAMPLES. FENAC WAS AGAIN FOUND AT THE HIGHEST LEVELS AND WITH GREATEST FREQUENCY. ANALYTICAL VALUES FOR BOTH B-NAPHTHYLAMINE AND FENAC WERE LOWER IN DOWNGRAIENT ZONE 2 SAMPLES THAN THOSE REPORTED IN ZONE 1. THIS ATTENUATING EFFECT IS CONSISTENT WITH THE EXPECTED CONTAMINANT MIGRATION PATHWAY AND CORRESPONDING DILUTING EFFECTS OF UNCONTAMINATED GROUNDWATER. THE COMPOUND CYANIDE WAS NOT DETECTED IN EITHER ROUND OF ZONE 2 SAMPLES.

SAMPLES TAKEN FROM DOWNGRAIENT ZONE 3 MONITORING WELLS DISPLAY FURTHER DILUTION IN THE CONCENTRATION OF FENAC, WHILE B-NAPHTHYLAMINE WAS NOT DETECTED IN ANY ZONE 3 SAMPLE. THE COMPOUND CYANIDE WAS DETECTED IN A SINGLE SAMPLE; HOWEVER, NO CASE CAN BE MADE FOR ITS OCCURRENCE AS A RESULT OF SITE CONTAMINATION.

TOTAL METALS

IN GENERAL, SAMPLES ACQUIRED FROM MONITORING WELLS IN ALL THREE ZONES DEMONSTRATED THE PRESENCE OF METALS AS WOULD BE EXPECTED IN A GEOCHEMICAL SETTING. GROUNDWATER IN ZONE 1 IS CONTAMINATED WITH ALUMINUM, ARSENIC, BERYLLIUM, CADMIUM, CHROMIUM, NICKEL, IRON, AND VANADIUM. THESE COMPOUNDS ARE DETECTED IN THE FIRST SAMPLING ROUND, BUT NOT IN THE MORE SELECTIVE SECOND SAMPLING ROUND SAMPLES.

THE METALS ALUMINUM, IRON, MAGNESIUM, MANGANESE, POTASSIUM, AND SODIUM OCCUR AT THE HIGHEST CONCENTRATIONS AND WITH THE GREATEST FREQUENCY BUT DO NOT APPEAR TO BE SITE RELATED. HEAVY METALS, INCLUDING MERCURY, LEAD, BARIUM, CADMIUM, CHROMIUM AND CYANIDE ARE ALSO DETECTED AT VARYING LEVELS.

OFFSITE GROUNDWATER SAMPLES TAKEN FROM ZONE 2 MONITORING WELLS DISPLAY THE SAME TYPE OF CONTAMINATION PRESENT IN ZONE 1 SAMPLES. AGAIN, ALUMINUM, IRON, MAGNESIUM, MANGANESE, POTASSIUM, AND SODIUM OCCUR AT THE HIGHEST CONCENTRATIONS AND WITH GREATEST FREQUENCY BUT THEIR RELATIONSHIP TO THE SITE IS NOT READILY DISCERNIBLE. THE HEAVY METALS, HOWEVER, OCCUR IN SOMEWHAT LOWER CONCENTRATIONS AND CYANIDE IS NOT DETECTED.

ZONE 3 SAMPLES SHOW THE ALUMINUM, IRON, MAGNESIUM, POTASSIUM, AND SODIUM OCCUR AT THE GREATEST CONCENTRATIONS AND FREQUENCY BUT THE HEAVY METALS SEEM TO INCREASE IN CONCENTRATION WITH DISTANCE FROM THE SITE, HENCE, THEY ARE PROBABLY NOT SITE RELATED, AS OPPOSED TO ZONE 2. THESE TRACE AMOUNTS OF METALS OCCUR IN SAMPLES UPGRADIENT OF THE SITE AND MAY BE INDIGENOUS TO THE AREA AND MAY OCCUR AS NATURAL CONSTITUENTS OF GROUNDWATER.

ANTIMONY AND ARSENIC ARE ALSO DETECTED IN LOW CONCENTRATIONS IN ZONE 3 SAMPLES BUT OCCUR WITH LIMITED FREQUENCY. DUE TO THEIR ERRATIC OCCURRENCE AND DISTRIBUTION THESE ELEMENTS MAY OR MAY NOT OCCUR AS A RESULT OF ACTIVITIES AT THE SITE.

#PEA

PUBLIC HEALTH AND ENVIRONMENTAL ASSESSMENT

CONTAMINATED SLUDGES, SOILS, AND GROUNDWATER REMAIN ON THE DRAKE SITE AND ADJACENT GORHAM PROPERTY. THESE FORM A SINGLE SOURCE THAT CONTINUES TO RELEASE CONTAMINANTS TO THE ENVIRONMENT, PRESENTING A POTENTIAL RISK TO HUMAN HEALTH.

HUMAN AND ENVIRONMENTAL RECEPTORS THAT MAY POTENTIALLY BE EXPOSED TO HAZARDOUS SITE ASSOCIATED CONTAMINANTS ARE AS FOLLOWS:

- PEOPLE WHO MAY, AT SOME TIME IN THE FUTURE, RESIDE ON OR NEAR THE SITE AND USE SITE-CONTAMINATED GROUNDWATER AS A SOURCE OF DRINKING WATER OR THOSE WHO CURRENTLY RESIDE OFFSITE AND CONSUME CLEAN GROUNDWATER THAT MAY BE EFFECTED BY SITE ASSOCIATED CONTAMINATION AT SOME FUTURE TIME. NO LOCK HAVEN RESIDENTS USE GROUNDWATER FOR DRINKING PURPOSES.
- THOSE INVOLVED IN RECREATIONAL WATER ACTIVITIES SUCH AS SWIMMING, BOATING OR FISHING AT THE BALD EAGLE CREEK AND DOWNSTREAM SUSQUEHANNA RIVER (BELOW THE BALD EAGLE CONFLUENCE).
- THOSE WHO CONSUME FISH TAKEN FROM BOTH BALD EAGLE CREEK AND BELOW THE CREEK CONFLUENCE WITH THE SUSQUEHANNA RIVER.
- AQUATIC FLORA AND FAUNA IN BALD EAGLE CREEK AND THE SUSQUEHANNA RIVER.

THE GROUNDWATER BENEATH THE SITE CONTAINS RELATIVELY HIGH LEVELS OF VOLATILE ORGANICS, PHENOLICS, B-NAPHTHYLAMINE, INORGANICS, AND FENAC THAT EXCEED RELEVANT REGULATORY STANDARDS AND/OR GUIDELINES ESTABLISHED SPECIFICALLY FOR THESE COMPOUNDS. THEIR PRESENCE (ESPECIALLY IN ZONES 1 AND 2) PRESENTS SIGNIFICANT PUBLIC HEALTH RISKS TO POTENTIAL GROUNDWATER USERS UNDER SEVERAL EXPOSURE SCENARIOS MENTIONED ABOVE.

THE MAIN CARCINOGENIC RISKS ARE FROM B-NAPHTHYLAMINE, 1,2-DICHLOROETHANE, VINYL CHLORIDE AND ARSENIC. THE RI ESTIMATES THE TOTAL CARCINOGENIC RISK TO BE 5.69×10^{-1} IF THE HIGHEST CONCENTRATIONS ARE COMBINED TO FORM THE WORST CASE SCENARIO.

THE BULK OF THE RISK (ZONES 1 AND 2) IS A RESULT OF THE PRESENCE OF ORGANIC CONTAMINANTS, B-NAPHTHYLAMINE, AND FENAC. AS THESE CONTAMINANTS MIGRATE AWAY FROM THE SITE (ZONE 3) VIA GROUNDWATER THE RISKS DECREASE DUE TO THE DISPERSIVE AND ADSORPTIVE EFFECTS OF TRANSPORT.

INORGANIC CONTAMINANTS INCLUDING CHROMIUM, CADMIUM, CYANIDE, AND TOTAL ARSENIC ARE FOUND THROUGHOUT THE STUDY AREA (ZONES 1, 2, AND 3) AND ACCOUNT FOR A SIZEABLE PORTION OF RISK IN ZONE 3. ANALYTICAL VALUES FOR THESE COMPOUNDS ARE, HOWEVER, FROM TOTAL INORGANIC ANALYSES (I.E., UNFILTERED SAMPLE MEDIA). THE PRESENCE OF CONTAMINANTS SUCH AS ANTIMONY, LEAD, CADMIUM, AND NICKEL ARE MOST LIKELY A RESULT OF SUSPENDED PARTICULATE MATERIAL IN THE AQUEOUS SAMPLES FROM DRILLING AND WELL DEVELOPMENT OPERATIONS. A CLEAR PATTERN OF INORGANIC CONTAMINATION IS NOT EVIDENT AND MAY OR MAY NOT BE RELATED TO ACTIVITIES AT THE DRAKE CHEMICAL SITE.

SURFACE WATER SAMPLES CONTAINED INORGANIC ANALYTES AND THE COMPOUND FENAC. ANALYTICAL VALUES FOR THESE CONSTITUENTS DO NOT EXCEED MCLS. THE CONTAMINANTS COPPER AND ZINC, HOWEVER, DO EXCEED THE AWQC CHRONIC TOXICITY VALUES FOR AQUATIC ORGANISMS. BOTH ZINC AND COPPER OCCUR IN UPGRADIENT SAMPLING LOCATIONS AND ARE

DETECTED THROUGHOUT THE STUDY AREA. THEIR PRESENCE IN SURFACE WATERS CANNOT BE ATTRIBUTED SPECIFICALLY TO ACTIVITIES AT THE DRAKE SITE.

#CR

COMMUNITY RELATIONS

EPA HAS BEEN INVOLVED IN SITE REMEDIATION AT DRAKE CHEMICAL SINCE 1982 WHEN THE FIRST REMOVAL ACTION OCCURRED AND THE AGENCY HAS ALWAYS MADE PUBLIC ANNOUNCEMENT OF THE ONSITE ACTIVITIES. THERE WAS A COMMUNITY RELATIONS PLAN FOR THE ENTIRE RI/FS ACTIVITIES SINCE 1983 WHEN THE FIRST RI BEGAN AND THESE ACTIVITIES HAVE INCLUDED SEVERAL PUBLIC MEETINGS. SPECIFIC COMMUNITY RELATIONS ACTIVITIES FOR PHASE I AND PHASE II ARE OUTLINED IN THEIR RESPECTIVE RODS AND WILL NOT BE REPEATED HERE. THEREFORE, THIS DECISION DOCUMENT WILL GO OVER ALL COMMUNITY RELATION ACTIVITIES FOR THE THIRD PHASE OF THE REMEDIAL ACTION SELECTION IN THIS ROD.

THE FIRST ATTEMPT TO SELECT A REMEDIAL CLEAN UP STANDARD WAS IN THE PHASE II RI/FS WHERE THE TECHNICAL DATA WAS COLLECTED AND REPORTED IN THE PHASE II RI REPORT. THIS WAS MADE AVAILABLE TO THE PUBLIC IN MARCH 1986 AND COPIES WERE PLACED IN THE LOCAL REPOSITORIES. THE FOUR REPOSITORIES WERE LOCATED AT THE LOCK HAVEN CITY HALL, THE CLINTON COUNTY COMMISSIONER'S OFFICE, THE LOCK HAVEN PUBLIC LIBRARY AND THE LOCK HAVEN UNIVERSITY LIBRARY. THE PHASE II FS, HOWEVER, DID NOT ADDRESS THE SOIL, SLUDGES AND GROUNDWATER BECAUSE NO FIRM DECISION COULD BE MADE AT THAT TIME ABOUT THE SOURCE REMEDIATION.

AT THAT TIME PADER WAS IN THE MIDDLE OF NEGOTIATING A CONSENT DECREE WITH THE NEIGHBORING AMERICAN COLOR AND CHEMICAL FACILITY FOR A RCRA CLOSURE AND IT WAS FELT THAT EPA'S SELECTED ALTERNATIVE FOR THE SOILS, SLUDGES AND GROUNDWATER SHOULD BE CONSISTENT WITH THE PADER CLOSURE REQUIREMENTS. THEREFORE THE AGENCIES WAITED UNTIL SEPTEMBER OF 1986 TO PRESENT THE PHASE III FS FOR THE SOIL, SLUDGES AND GROUNDWATER.

ON SEPTEMBER 7, 1986, THE AGENCY HELD ANOTHER PUBLIC MEETING TO PRESENT A "PREFERRED ALTERNATIVE" FOR THE SITE. EPA SELECTED AN OPTION WHICH WOULD LEAVE THE SOIL AND SLUDGES IN PLACE. THE "PREFERRED ALTERNATIVE" WOULD BE TO LOWER THE WATER TABLE BY EXTRACTION WELLS AND TO PLACE A RCRA TYPE CAP TO COVER THE SITE AND PREVENT FURTHER INFILTRATION OF WATER. THE PUBLIC REACTION WAS EXTREMELY NEGATIVE. THIS REACTION PROMPTED THE AGENCY TO CHANGE ITS "PREFERRED ALTERNATIVE" TO A COMPLETE NEW RCRA TYPE LANDFILL ONSITE. THEN FURTHER DISCUSSION WERE HELD WITH LOCAL OFFICIALS AND PADER. SHORTLY THEREAFTER, PADER SELECTED ITS "PREFERRED ALTERNATIVE" WHICH WAS TO EXCAVATE THE SOIL AND SLUDGES AND PLACE THEM IN AN OFFSITE LANDFILL. THEREFORE THE AGENCIES DISAGREED ON THE LOCATION FOR THE PROPOSED CONTAINMENT FACILITY.

THIS DISAGREEMENT WAS NOT RESOLVED AND BY OCTOBER 1986 CONGRESS PASSED THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT. THIS NEW LAW SPECIFICALLY STATED A STRONG PREFERENCE FOR PERMANENT TREATMENT METHODS AND ALSO STATED THAT LANDFILLS WERE THE LEAST PREFERRED ALTERNATIVE. THE RESULT WAS TO REINVESTIGATE THE SITE AND POTENTIAL TREATMENT TECHNOLOGIES WHICH COULD PROVIDE A PERMANENT SOLUTION.

THE PHASE III RI AND SUBSEQUENT FS WERE INITIATED IN JANUARY 1987 AND HAVE LEAD TO THE PRESENT SET OF RI/FS DOCUMENTS WHICH ARE PART OF THE ADMINISTRATIVE RECORD AND IN THE LOCAL REPOSITORIES. THROUGHOUT THIS PROCESS WE HAVE KEPT THE LOCAL AND STATE OFFICIALS INFORMED OF OUR ACTIVITIES AND HAVE HAD SOME NEWSPAPER COVERAGE DURING THE FIELD ACTIVITIES.

EPA'S PROPOSED PLAN WAS PUBLISHED IN AN ADVERTISEMENT ON AUGUST 31, 1988 AND INCLUDED THE ALTERNATIVE SELECTED HEREIN. THE ADVERTISEMENT IN THE LOCK HAVEN PAPER ANNOUNCED THE BEGINNING OF A 30 DAY PUBLIC COMMENT PERIOD AND A PUBLIC MEETING WHICH WAS HELD ON SEPTEMBER 7, 1988 IN LOCK HAVEN. THE PUBLIC MEETING WAS PRECEDED BY A MEETING WITH THE CITY AND COUNTY OFFICIALS AND THE MINUTES FROM BOTH MEETINGS ARE ATTACHED AS PART OF THE RESPONSIVENESS SUMMARY.

IN GENERAL, THE COMMUNITY APPEARS TO BE IN AGREEMENT WITH THE REMEDIES SELECTED IN THIS ROD AND ARE PLEASED WITH THE PERMANENT DESTRUCTION OF THE SOIL AND SLUDGES. THEY ALSO ARE PLEASED THAT THE SITE WILL POSSIBLY BE AVAILABLE FOR SOME OTHER USE WHEN THE SELECTED REMEDIAL ACTIONS ARE COMPLETED.

#DRA

DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES (RAAS)

DURING THE PHASE III FS, REMEDIAL TECHNOLOGIES WERE STUDIED TO DETERMINE WHICH WOULD BE APPLICABLE TO THE SPECIFIC CONDITIONS AT THE DRAKE CHEMICAL SITE. SCREENING OF THE TECHNOLOGIES WAS BASED ON DATA FROM THE PHASE III RI AND ON APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS), AS DESCRIBED BY THE NCP AS AMENDED BY SARA. ARARS CAN BE LOOSELY DEFINED AS REQUIREMENTS OF STATE OR FEDERAL ENVIRONMENTAL LAWS. EPA MUST ENSURE THAT THE SUPERFUND RESPONSE ACTION ATTAINS ALL PERTINENT STATE AND FEDERAL ENVIRONMENTAL REQUIREMENTS. ARARS APPLIED TO THE SITE FALL INTO THREE BROAD CATEGORIES: CONTAMINANT-SPECIFIC ARARS GOVERN THE LEVEL OF CLEANUP TO BE ATTAINED. FOR EXAMPLE, MCLS CONCERN INDIVIDUAL SUBSTANCES AND IDENTIFY CONCENTRATION LEVELS FOR EACH THAT CAN NOT BE EXCEEDED. LOCATION-SPECIFIC ARARS ARE THOSE CONCERNING NATURAL OR MAN-MADE SITE CHARACTERISTICS, SUCH AS WETLANDS, SCENIC RIVERS, HISTORIC DISTRICTS, AND AQUIFER

DESIGNATIONS. OF SPECIAL CONCERN AT THE DRAKE CHEMICAL SITE ARE THE LOCATION OF THE SITE IN THE FLOODPLAINS OF BOTH THE SUSQUEHANNA RIVER AND BALD EAGLE CREEK AND THE DESIGNATION OF THE GROUNDWATER AQUIFER AS A PROTECTED POTENTIAL DRINKING WATER SUPPLY. ARARS THAT PERTAIN TO THE IMPLEMENTATION OF A PARTICULAR REMEDY ARE ACTION-SPECIFIC ARARS. EXAMPLES INCLUDE MONITORING REQUIREMENTS, EFFLUENT DISCHARGE LIMITATIONS, AND OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS. IN ADDITION TO THESE CONSIDERATIONS, EACH REMEDIAL TECHNOLOGY SELECTION MUST ALSO BE GUIDED BY AN EVALUATION OF THE FOLLOWING CRITERIA: SHORT-TERM EFFECTIVENESS; LONG-TERM EFFECTIVENESS AND PERMANENCE; REDUCTION OF TOXICITY, MOBILITY, OR VOLUME; EASE OF IMPLEMENTATION; COST; PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT; AND ACCEPTABILITY TO THE STATE AND COMMUNITY.

DURING THE FS, MANY TECHNOLOGIES WERE EVALUATED FOR THE DRAKE CHEMICAL SITE. THOSE THAT WERE JUDGED APPLICABLE WERE COMBINED INTO PROCESS SCHEMES, CALLED RAAS. FOR OPERABLE UNIT A, SEVERAL ALTERNATIVES WERE SELECTED FOR CONTINUED CONSIDERATION. SOME ARE SINGLE TECHNOLOGY ALTERNATIVES THAT HAVE BEEN SUFFICIENTLY DEVELOPED AND TESTED SO THAT THEIR USE AT THE DRAKE CHEMICAL SITE SHOULD BE HIGHLY SUCCESSFUL. THESE RECOMMENDED ALTERNATIVES FOR OPERABLE UNIT A (ALTERNATIVES A-1 AND B-1) HAVE THE PROVEN ABILITY TO TREAT ALL CONTAMINANT TYPES PRESENT AT THE SITE FOR THE FULL RANGE OF CONTAMINANT CONCENTRATIONS. OTHER ALTERNATIVES (ALTERNATIVES C-1 AND D-1) WILL REQUIRE MODERATE TO EXTENSIVE TREATABILITY TESTS, BECAUSE THEY ARE EMERGING TECHNOLOGIES FOR HAZARDOUS WASTE APPLICATIONS. THE MIXTURE OF ORGANIC AND INORGANIC CONTAMINANTS PRESENT IN THE GROUNDWATER REQUIRES A COMBINATION OF TREATMENT TECHNOLOGIES TO ACHIEVE TREATMENT GOALS FOR OPERABLE UNIT B. ALL THE RAAS DEVELOPED INVOLVE GROUNDWATER PUMPING AND TREATING METHODS, BUT EACH RAA FEATURES A DIFFERENT SECONDARY TREATMENT STEP IN THE WASTEWATER TREATMENT PROCESS.

THE RAAS CONSIDERED FOR OPERABLE UNITS A AND B ARE DESCRIBED BELOW. FOR EACH UNIT, A NO-ACTION ALTERNATIVE IS CONSIDERED, AS REQUIRED BY LAW. ALL OF THE OTHER RAAS WILL INCLUDE FLOOD PROTECTION FOR THE SOIL/SLUDGE TREATMENT UNIT AND THE GROUNDWATER TREATMENT SYSTEM.

OPERABLE UNIT A - SLUDGE, SOIL, AND SEDIMENT RAAS

- 1) NO ACTION WITH MONITORING.
- 2) A-1 - EXCAVATING ALL SLUDGES/SOILS/SEDIMENTS; TREATING WITH ROTARY KILN INCINERATION; DISPOSING OF INCINERATOR ASH; BACKFILLING, REGRADING, AND REVEGETATING THE SITE.
- 3) B-1 - EXCAVATING ALL SLUDGES/SOILS/SEDIMENTS; TREATING WITH INFRARED INCINERATION; DISPOSING OF INCINERATOR ASH; BACKFILLING, REGRADING, AND REVEGETATING THE SITE.
- 4) C-1 - TREATMENT USING IN-SITU VITRIFICATION TO IMMOBILIZE CONTAMINANTS; BACKFILLING, REGRADING, AND REVEGETATING THE SITE.
- 5) D-1 - INSTALLING INJECTION AND EXTRACTION WELLS ABOVE THE WATER TABLE FOR IN-SITU SOIL WASHING, USING EFFLUENT FROM THE OPERABLE UNIT B WASTEWATER TREATMENT PLANT (WWTP) AS A FLUSHING AGENT, THEN TREATING THE RESULTING CONTAMINATED WASTEWATER STREAM.

OPERABLE UNIT B - GROUNDWATER RAAS

- 1) NO ACTION WITH MONITORING.
- 2) MODIFIED RAA-1 - INSTALLING EXTRACTION WELLS; BUILDING A TREATMENT PLANT FEATURING SAND FILTRATION AND CARBON ADSORPTION; TREATING EXTRACTION STREAM; DISCHARGING EFFLUENT; DISPOSING OF RESIDUALS; MONITORING GROUNDWATER.
- 3) RAA-4 - INSTALLING EXTRACTION WELLS; BUILDING A TREATMENT PLANT FEATURING BIOLOGICAL ACTIVATED CARBON (BAC); TREATING EXTRACTION STREAM; DISCHARGING EFFLUENT; DISPOSING OF RESIDUALS; MONITORING GROUNDWATER.
- 4) RAA-5 - INSTALLING EXTRACTION WELLS; BUILDING A TREATMENT PLANT FEATURING SAND FILTRATION AND OZONE/UV; TREATING AND DISCHARGING EFFLUENT TO A PUBLICLY OWNED TREATMENT WORKS (POTW) FOR POST TREATMENT; DISPOSING OF RESIDUALS; MONITORING GROUNDWATER.
- 5) RAA-5A - INSTALLING EXTRACTION WELLS; BUILDING A TREATMENT PLANT FEATURING SAND FILTRATION, OZONE/UV, AND ACTIVATED SLUDGE; TREATING EXTRACTION STREAM; DISPOSING OF RESIDUALS AND MONITORING GROUNDWATER.

TABLE 2

OPERABLE UNIT A - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

** NO ACTION WITH MONITORING

* DEED RESTRICTIONS TO PREVENT DIRECT CONTACT WITH THE SOURCE.
POSSIBLY INSTALL FLOOD PROTECTION. ONGOING MONITORING.

SHORT-TERM EFFECTIVENESS

* PROTECTION WILL NOT BE ACHIEVED.

LONG-TERM EFFECTIVENESS AND PERMANENCE

* SITUATION UNCHANGED. NO REDUCTION OF EXISTING RISK.

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

* NONE

IMPLEMENTABILITY

* GROUNDWATER MONITORING WOULD BE EASY TO IMPLEMENT AND CONSTRUCT.

COST (PRESENT WORTH)

* \$654,000

COMPLIANCE WITH ARARS

* DOES NOT MEET STATE HEALTH DEPARTMENT CRITERIA FOR GROUNDWATER QUALITY.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

* RISK OF DIRECT CONTACT WITH CONTAMINATED SOILS/SLUDGES CURRENTLY CONTROLLED BY FENCE.

* ENVIRONMENTAL DEGRADATION WILL INCREASE AS LEACHING FROM ONSITE
SOILS/SLUDGES TO THE GROUNDWATER CONTINUES.

STATE ACCEPTANCE

* NOT ACCEPTABLE

COMMUNITY ACCEPTANCE

* NOT ACCEPTABLE

TABLE 2 CONTINUED

OPERABLE UNIT A - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

** ALTERNATIVE A1
ROTARY KILN INCINERATION

SHORT-TERM EFFECTIVENESS

- * 3-5 YEARS TO INCINERATE 252,000 CUBIC YARDS.
- * WELL PROVEN AND RELIABLE TECHNOLOGY FOR DESTRUCTION OF ORGANICS.
- * PROTECTION OF COMMUNITY DURING REMEDIAL ACTION WILL NEED TO BE ADDRESSED.
- * PROTECTION OF WORKERS DURING REMEDIAL ACTIONS IS ALSO NEEDED.

LONG-TERM EFFECTIVENESS AND PERMANENCE

- * NO RISK REMAINS ASSOCIATED WITH ORGANICS. MINOR RISK REMAINS FROM RESIDUALS REMAINING ON SITE, INCLUDING METALS IN THE INCINERATOR ASH.

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

- . TOXICITY AND VOLUME OF ESSENTIALLY ALL ORGANICS DESTROYED. METALS REMAIN IN INCINERATOR ASH; VOLUME REDUCTION IS MINIMAL. TREATMENT IS IRREVERSIBLE.

IMPLEMENTABILITY

- * INCINERATION WOULD REQUIRE SPECIAL EQUIPMENT AND OPERATORS. RESIDUALS REQUIRE TESTING TO VERIFY TREATMENT.
- * LIMITED TREATABILITY TESTING REQUIRED.
- * MOBILE INCINERATOR AND SPECIALIZED OPERATORS NEEDED. NOT LOCALLY AVAILABLE.

COST (PRESENT WORTH)

- * \$81,284,000
- * OPERATION AND MAINTENANCE COSTS NOT APPLICABLE

TABLE 2 CONTINUED

OPERABLE UNIT A - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

COMPLIANCE WITH ARARS

- * ALL ARARS WILL BE MET OR EXCEEDED. EP TOXICITY OR TCLP TESTING OF INCINERATOR ASH LEACHATE WILL BE REQUIRED.
- * COMPLIANCE WITH CRITERIA, ADVISORIES AND GUIDANCE. COMPLIES WITH FEDERAL, STATE, AND LOCAL CRITERIA.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

- * RISKS OF DIRECT CONTACT WITH CONTAMINATED SOILS, SLUDGES, AND DUST ELIMINATED BY TREATMENT.
- * FOR ORGANICS, RISK TO HUMAN HEALTH AND THE ENVIRONMENT FROM GROUNDWATER CONTAMINATION PERMANENTLY ELIMINATED BY TREATMENT OF SOILS/SLUDGES/SEDIMENTS AND GROUNDWATER.
- * ELIMINATION, REDUCTION OR CONTROL OF RISKS. FOR METALS IN THE RESIDUAL ASH LEACHATE, TESTING IS REQUIRED TO DETERMINE APPLICABILITY TO USE AS BACKFILL.
- * FOR OFFSITE INCINERATION, ALL RISKS ARE ELIMINATED.

STATE ACCEPTANCE

- * ACCEPTABLE

COMMUNITY ACCEPTANCE

- * ACCEPTABLE
- ** ALTERNATIVE B1
INFRARED INCINERATION

SHORT-TERM EFFECTIVENESS

- * TIME UNTIL PROTECTION IS ACHIEVED. 4-1/2 TO 7 YEARS TO INCINERATE 252,000 CUBIC YARDS.
- * WELL PROVEN AND RELIABLE TECHNOLOGY FOR DESTRUCTION OF ORGANICS. SOME TREATABILITY TESTING REQUIRED.
- * PROTECTION OF COMMUNITY DURING REMEDIAL ACTIONS NEEDED.
- * PROTECTION OF WORKERS DURING REMEDIAL ACTIONS NEEDED.

TABLE 2 CONTINUED

OPERABLE UNIT A - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

LONG-TERM EFFECTIVENESS AND PERMANENCE

- * NO RISK REMAINS ASSOCIATED WITH ORGANICS. MINOR RISK REMAINS FROM RESIDUALS REMAINING ON SITE, INCLUDING METALS IN THE INCINERATOR ASH.

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

- * TOXICITY AND VOLUME OF ESSENTIALLY ALL ORGANICS WOULD BE DESTROYED. METALS REMAIN IN THE INCINERATOR ASH; VOLUME REDUCTION IS MINIMAL. TREATMENT IS IRREVERSIBLE.

IMPLEMENTABILITY

- * INCINERATION WOULD REQUIRE SPECIAL EQUIPMENT AND OPERATORS. RESIDUALS REQUIRE TESTING TO VERIFY TREATMENT EFFECTIVENESS. COMMERCIAL TECHNOLOGY.
- * LIMITED TREATABILITY TESTING REQUIRED.

COST (PRESENT WORTH)

- * \$171,912,000

COMPLIANCE WITH ARARS

- * ALL ARARS WILL BE MET OR EXCEEDED. EP TOXICITY OR TCLP TESTING OF INCINERATOR ASH LEACHATE WILL BE REQUIRED.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

- * RISKS OF DIRECT CONTACT WITH CONTAMINATED SOILS, SLUDGES, AND DUST ELIMINATED BY TREATMENT.
- * FOR ORGANICS, RISK TO HUMAN HEALTH AND THE ENVIRONMENT FROM GROUNDWATER CONTAMINATION PERMANENTLY ELIMINATED BY TREATMENT OF SOILS/SLUDGES/SEDIMENTS AND GROUNDWATER.
- * FOR METALS IN THE RESIDUAL ASH LEACHATE, TESTING IS REQUIRED TO DETERMINE APPLICABILITY TO USE AS BACKFILL. FOR OFFSITE INCINERATION, ALL RISKS ARE ELIMINATED.

STATE ACCEPTANCE

- * ACCEPTABLE

COMMUNITY ACCEPTANCE

- * ACCEPTABLE

TABLE 2 CONTINUED

OPERABLE UNIT A - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

** ALTERNATIVE C1
IN-SITU VITRIFICATION

SHORT-TERM EFFECTIVENESS

- * 3 TO 11 ½ YEARS TO VITRIFY 252,000 CUBIC YARDS.
- * PROTECTION OF A COMMUNITY DURING REMEDIAL ACTIONS NEEDED
- * PROTECTION OF WORKERS DURING REMEDIAL ACTIONS NEEDED

LONG-TERM EFFECTIVENESS AND PERMANENCE

- * NO RISKS SHOULD REMAIN ASSOCIATED WITH ORGANICS OR METALS. TREATABILITY TESTING WILL BE REQUIRED TO CONFIRM.

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

- * ESSENTIALLY ALL ORGANIC TOXICITY IS DESTROYED THROUGH PYROLYSIS OR IMMOBILIZED, WITH METALS, IN THE VITRIFICATION MATRIX. CONFIRMATION THROUGH TREATABILITY TESTING IS REQUIRED. TREATMENT IS IRREVERSIBLE.

IMPLEMENTABILITY

- * VITRIFICATION WOULD REQUIRE SPECIAL EQUIPMENT AND OPERATORS. PILOT PLANT SCALE FOR HAZARDOUS WASTE APPLICATIONS.
- * LIMITED EXCAVATION AND STAGING OPERATIONS.

COST (PRESENT WORTH)

- * \$117,564,000

COMPLIANCE WITH ARARS

- * ALL ARARS WILL BE MET OR EXCEEDED.
- * COMPLIANCE WITH CRITERIA, ADVISORIES, AND GUIDANCE
- * COMPLIES WITH FEDERAL, STATE, AND LOCAL CRITERIA.

TABLE 2 CONTINUED

OPERABLE UNIT A - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

- * RISKS OF DIRECT CONTACT WITH CONTAMINATED SOILS, SLUDGES AND DUST ELIMINATED BY TREATMENT.
- * RISK TO HUMAN HEALTH AND THE ENVIRONMENT FROM GROUNDWATER CONTAMINATION PERMANENTLY ELIMINATED BY TREATMENT OF SOILS/SLUDGES/SEDIMENTS AND GROUNDWATER.

STATE ACCEPTANCE

- * ACCEPTABLE

COMMUNITY ACCEPTANCE

- * ACCEPTABLE
- ** ALTERNATIVE D1
SOIL WASHING

SHORT-TERM EFFECTIVENESS

- * REMEDIATION NOT ATTAINED, EVEN IN 30 YEARS FOR B-NAPHTHYLAMINE AND METALS.
- SHORT TERM RELIABILITY OF TECHNOLOGY

- * PROTECTION OF COMMUNITY DURING REMEDIAL ACTIONS NEEDED
- * PROTECTION OF WORKERS DURING REMEDIAL ACTIONS NEEDED

LONG-TERM EFFECTIVENESS AND PERMANENCE

- * SIGNIFICANT RISK REMAINS, PRIMARILY FROM B-NAPHTHYLAMINE. RESIDUAL CONTAMINATION MAY CONTAMINATE GROUNDWATER. GROUNDWATER MAY BE ADVERSELY AFFECTED BY SOIL ADDITIVE AGENTS (IF REQUIRED).
- * PROPER MAINTENANCE IS VERY IMPORTANT. PUMPS MAY NEED REPLACEMENT. REDUCTION OF TOXICITY, MOBILITY OR VOLUME
- * RESIDUAL AND VOLUME OF SOME ORGANICS REMOVED THROUGH SOIL WASHING AND TREATED BY THE WWTP. INSIGNIFICANT AMOUNTS OF METALS WOULD BE REMOVED. TREATMENT IS IRREVERSIBLE.

TABLE 2 CONTINUED

OPERABLE UNIT A - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

IMPLEMENTABILITY

- * MOST LIKELY IMPLEMENTABLE FOR THE SOILS BUT NOT THE SLUDGES BECAUSE OF HYDRAULIC CONDUCTIVITY CONSIDERATIONS. BARRIER WALLS OR INTERCEPTOR TRENCHES MAY BE REQUIRED TO PREVENT OFF SITE MIGRATION. SOIL ADDITIVES MAY BE REQUIRED TO ENHANCE THE PROCESS.

COST (PRESENT WORTH)

- * \$26,856,000

COMPLIANCE WITH ARARS

- * CONTAMINANT-SPECIFIC ARARS WILL NOT BE MET FOR CERTAIN CONTAMINANTS IN THE SOIL, PARTICULARLY B-NAPHTHYLAMINE.
- * DOES NOT MEET STATE HEALTH DEPARTMENT CRITERIA FOR ALL CONTAMINANTS.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

- * RISKS OF DIRECT CONTACT PARTIALLY REDUCED BY TREATMENT.
- * RISK TO HUMAN HEALTH AND THE ENVIRONMENT FROM GROUNDWATER CONTAMINATION PARTIALLY REDUCED BY TREATMENT OF SOILS/SLUDGES/SEDIMENTS AND GROUNDWATER.
- * REMAINING RISK PRIMARILY DUE TO B-NAPHTHYLAMINE.

STATE ACCEPTANCE

- * NOT ACCEPTABLE

COMMUNITY ACCEPTANCE

- * NOT ACCEPTABLE

TABLE 2 CONTINUED

OPERABLE UNIT B - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

** NO ACTION WITH MONITORING

SHORT-TERM EFFECTIVENESS

* PROTECTION WILL NOT BE ACHIEVED.

LONG-TERM EFFECTIVENESS

* SITUATION UNCHANGED; NO REDUCTION OF EXISTING RISK.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

* NO AMOUNT OF HAZARDOUS MATERIALS DESTROYED OR TREATED

* NO DEGREE OF EXPECTED REDUCTION IN TOXICITY, MOBILITY OR VOLUME

* NO TYPE AND QUANTITIES OF RESIDUAL REMAINING AFTER TREATMENT

IMPLEMENTABILITY

* GROUNDWATER MONITORING WOULD BE EASY TO IMPLEMENT AND CONSTRUCT.

ZONE 1, 2 AND 3 PUMPING OPTION COSTS

* PRESENT WORTH - \$654,000

* OPERATING AND MAINTENANCE COSTS - \$66,000

COMPLIANCE WITH ARARS

* DOES NOT MEET STATE HEALTH DEPARTMENT CRITERIA FOR GROUNDWATER QUALITY.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

* NO CONTROLS.

* ENVIRONMENTAL DEGRADATION WILL INCREASE AS THE GROUNDWATER PLUME SPREADS.

STATE ACCEPTANCE

* NOT ACCEPTABLE

TABLE 2 CONTINUED

OPERABLE UNIT B - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

COMMUNITY ACCEPTANCE

- * NOT ACCEPTABLE
- * DEED RESTRICTIONS TO PREVENT ON SITE OR OFF SITE USE OF CONTAMINATED GROUNDWATER. ONGOING MONITORING.
- ** ALTERNATIVE M1 - SAND & FILTRATION & CARBON ADSORPTION

SHORT-TERM EFFECTIVENESS

- * APPROXIMATELY 30 YEARS FOR TREATMENT TO BE COMPLETED.
- * WELL PROVEN AND RELIABLE TREATMENT TECHNOLOGIES.
- * PROTECTION OF WORKERS DURING REMEDIAL ACTIONS NEEDED

LONG-TERM EFFECTIVENESS

- * EXISTING RISK ELIMINATED.
- * EXCELLENT LONG-TERM RELIABILITY BASED ON PERFORMANCE OF EXISTING SIMILAR SYSTEMS.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

- * TOXICITY REMOVED FROM GROUNDWATER.

IMPLEMENTABILITY

- * SIZEABLE UNDERTAKING BUT QUITE FEASIBLE TO DESIGN, CONSTRUCT AND OPERATE TREATMENT.
- * SPENT GRANULAR ACTIVATED CARBON WILL REQUIRE REGENERATION BY PYROLYSIS.

ZONES 1, 2 AND 3 - PUMPING OPTION COSTS

- * PRESENT WORTH - \$26,203,000
- * OPERATING & MAINTENANCE COSTS - \$1,528,000 (AVERAGE)

COMPLIANCE WITH ARARS

- * ALL ARARS WILL BE MET.
- * COMPLIES WITH STATE AND LOCAL CRITERIA AND FEDERAL ADVISORIES.

TABLE 2 CONTINUED

OPERABLE UNIT B - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

- * RISKS TO HUMAN HEALTH AND THE ENVIRONMENT SIGNIFICANTLY REDUCED 1×10^{-5} RISK LEVEL, BY EXTRACTION AND TREATMENT OF THE GROUNDWATER.

STATE ACCEPTANCE

- * ACCEPTABLE

COMMUNITY ACCEPTANCE

- * ACCEPTABLE

** ALTERNATIVE 4 - BIOLOGICAL ACTIVATED CARBON - (BAC)

SHORT-TERM EFFECTIVENESS

- * TIME UNTIL PROTECTION IS ACHIEVED - APPROXIMATELY 30 YEARS. BAC IS EXPECTED TO HAVE AN EXCELLENT SHORT-TERM RELIABILITY.
- * TREATABILITY TESTING IS REQUIRED.
- * PROTECTION OF COMMUNITY DURING REMEDIAL ACTIONS NEEDED
- * PROTECTION OF WORKERS DURING REMEDIAL ACTIONS NEEDED

LONG-TERM EFFECTIVENESS

- * REDUCTION OF EXISTING RISKS - EXISTING RISK ELIMINATED.
- * ONLY LONG-TERM RISK IS GENERATION OF RESIDUE.

LONG-TERM EFFECTIVENESS

- * LONG-TERM RELIABILITY - EXCELLENT LONG-TERM RELIABILITY BASED ON PERFORMANCE OF EXISTING RELATED SYSTEMS.

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

- * TOXICITY REMOVED FROM GROUNDWATER.

IMPLEMENTABILITY

- * TECHNICAL FEASIBILITY - SIZEABLE UNDERTAKING BUT QUITE FEASIBLE TO DESIGN, EXTRACT AND OPERATE TREATMENT.

TABLE 2 CONTINUED

OPERABLE UNIT B - SUMMARY OF COMPARISONS AMONG ALTERNATIVES
DRAKE CHEMICAL SITE, LOCK HAVEN, PENNSYLVANIA

ZONES 1, 2 AND 3 PUMPING OPTION COSTS

- * PRESENT WORTH - \$16,079,000
- * OPERATING & MAINTENANCE COSTS - \$787,000 (AVERAGE)

COMPLIANCE WITH ARARS

- * ALL ARARS WILL BE MET.
- * COMPLIES WITH STATE AND LOCAL CRITERIA AND FEDERAL ADVISORIES.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

- * RISK TO HUMAN HEALTH AND THE ENVIRONMENT SIGNIFICANTLY REDUCED TO $1 \times (10^{-5})$ RISK LEVEL, BY EXTRACTION AND TREATMENT OF THE GROUNDWATER.

STATE ACCEPTANCE

- * ACCEPTABLE

COMMUNITY ACCEPTANCE

- * ACCEPTABLE
- ** ALTERNATIVE 5 - SAND FILTRATION AND OZONE/UV

SHORT-TERM EFFECTIVENESS

- * TIME UNTIL PROTECTION IS ACHIEVED - APPROXIMATELY 30 YEARS.
- * RELIABILITY IS EXPECTED TO BE EXCELLENT. TREATABILITY TESTING IS REQUIRED TO VERIFY EFFICIENCY AND DESIGN OF OZONE/UV PROCESS.
- * PROTECTION OF WORKERS DURING REMEDIAL ACTIONS NEEDED

LONG-TERM EFFECTIVENESS

- * EXISTING RISK ELIMINATED ALTHOUGH SOME NONTOXIC ORGANIC POLLUTANTS MAY REMAIN, WHICH WILL BE TREATED BY THE LOCAL POTW.
- * ONLY LONG-TERM RISK IS GENERATION OF RESIDUE.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

- * TOXICITY REMOVED FROM GROUNDWATER.

IMPLEMENTABILITY

- * SIZABLE UNDERTAKING BUT QUITE FEASIBLE TO DESIGN, EXTRACT AND OPERATE TREATMENT

ZONES 1, 2 AND 3 PUMPING OPTION COSTS

- * PRESENT WORTH \$22,874,000
- * OPERATING AND MAINTENANCE COSTS \$ 1,110,000

COMPLIANCE WITH ARARS

- * COMPLIES WITH STATE AND LOCAL CRITERIA AND FEDERAL ADVISORIES.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

* RISK TO HUMAN HEALTH SIGNIFICANTLY REDUCED.

STATE ACCEPTANCE

* ACCEPTABLE

COMMUNITY ACCEPTANCE

* ACCEPTABLE

RECOMMENDED ALTERNATIVE

AFTER EXTENSIVE REVIEW BY EPA AND PADER THE AGENCIES HAVE CHOSEN TO REMEDIATE THE SOIL AND SLUDGES BY TREATMENT WITH AN ONSITE MOBILE ROTARY KILN INCINERATOR AND TO REMEDIATE THE GROUNDWATER IN ZONES 1 AND 2 BY AN ONSITE WATER TREATMENT UNIT FEATURING THE BIOLOGICAL ACTIVATED CARBON, THE FOLLOWING TASKS WILL BE PERFORMED AS PART OF THE REMEDIAL ACTION.

- INSTALL NECESSARY FLOOD CONTROL MEASURES
- REMOVE AQUEOUS WASTES FROM LEACHATE LAGOON AREA AND TREAT
- INSTALL PERMANENT STORMWATER MANAGEMENT CONTROLS IN THE LEACHATE LAGOON AREA AND OTHER AREAS TO BE EXCAVATED.
- EXCAVATE APPROXIMATELY 252,000 CUBIC YARDS OF CONTAMINATED SLUDGE/SOILS/SEDIMENTS AND DECONTAMINATE USING A TRANSPORTABLE , ONSITE, ROTARY KILN INCINERATOR (THE THERMAL TREATMENT UNIT MUST COMPLY WITH INCINERATION PERMIT REQUIREMENTS INCLUDING AIR EMISSIONS AND MONITORING.)
- ANALYZE INCINERATOR ASH AND USE AS BACKFILL IF ACCEPTABLE IN ACCORDANCE WITH STATE REQUIREMENTS (FURTHER TREATMENT OF ASH UNSUITABLE FOR BACKFILL MAY BE NECESSARY FOR ONSITE DISPOSAL.)
- REMOVE UNNECESSARY OBSTACLES, SUCH AS WATER AND SEWAGE LINES FROM THE FACILITIES AND MAINTAIN LOCAL LINES THAT ARE PRESENTLY IN USE
- BACKFILL EXCAVATED AREAS WITH SUITABLE MATERIAL, REGRADE TO PROVIDE POSITIVE DRAINAGE, AND REVEGETATE THE TOPSOIL TO CONTROL EROSION
- COLLECT AND TREAT ALL CONTAMINATED WATER THAT ENTERS THE SITE (E.G. GROUNDWATER, STORMWATER, AND DECONTAMINATED WATER) AT THE GROUNDWATER TREATMENT SYSTEM
- DESIGN AND CONSTRUCT AND ONSITE WASTEWATER TREATMENT PLANT
- INSTALL EXTRACTION WELLS IN THE AREAS OF GROUNDWATER CONTAMINATION WITHIN THE PROPERTY BOUNDARIES OF THE FORMER DRAKE CHEMICAL FACILITIES AND IN THE PROPERTIES ADJACENT TO THE FACILITY IN THE SOUTH AND EAST DIRECTIONS
- PUMP GROUNDWATER TO THE TREATMENT SYSTEM
- TREAT BY USING BIOLOGICAL ACTIVATED CARBON (BAC)
- DISCHARGE EFFLUENT TO BALD EAGLE CREEK EITHER THROUGH THE UNDERGROUND CONDUIT CONSTRUCTED FOR THE PHASE I LEACHATE STREAM OR THROUGH THE LOCK HAVEN SEWAGE TREATMENT FACILITY (THE WATER TREATMENT UNIT MUST COMPLY WITH PERMIT REQUIREMENTS FOR DISCHARGE OF TREATED WATER)
- ANALYZE RESIDUALS (E.G. SLUDGECAKE) AND USE AS BACKFILL IF ACCEPTABLE IN ACCORDANCE WITH STATE REQUIREMENTS (FURTHER TREATMENT MAY BE NECESSARY FOR ONSITE DISPOSAL.)

THIS ALTERNATIVE IS SELECTED FOR THE SOIL AND SLUDGES ONSITE BECAUSE IT WILL PROVIDE FOR CONTAMINANTS AND POTENTIAL HEALTH THREATS FROM KNOWN CARCINOGENS AND OTHER TOXIC CHEMICALS. THE ASH WILL BE ANALYZED FOR POSSIBLE METAL CONCENTRATIONS WHICH MAY REQUIRE FURTHER TREATMENT. ALL ACCEPTABLE MATERIALS WILL BE PLACED BACK ON THE SITE AS FILL MATERIAL AFTER EXCAVATION.

THE ENTIRE SITE OF 12 ½ ACRES WILL BE EXCAVATED TO THE WATER TABLE AND WILL BE TREATED BY THE THERMAL TREATMENT UNIT. THE AGENCY HAS SELECTED THIS ALTERNATIVE BECAUSE THE CHEMICAL ANALYSIS HAS SHOWN THAT THE LEVEL OF CONTAMINANTS THROUGHOUT THE SITE DO PRESENT A HEALTH RISK AND IT IS KNOWN THAT SOME OF THE SPECIFIC COMPOUNDS COULD BE PRESENT EVEN IF THEY ARE NO SPECIFICALLY DETECTED BY ANALYTICAL METHODS. THEREFORE THE ENTIRE SITE WHICH INCLUDES THE DRAKE CHEMICAL PROPERTY AND THE GORHAM PROPERTY ARE SLATED FOR EXCAVATION AND INCINERATION.

NO SPECIFIC CHEMICAL LEVELS ARE ESTABLISHED BECAUSE THE EXCAVATING SHOULD CONTINUE TO THE WATER TABLE WHERE THE SECOND PORTION OF THE REMEDY WILL ADDRESS GROUNDWATER TREATMENT.

THE GROUNDWATER TREATMENT OF BIOLOGICAL ACTIVATED CARBON WAS SELECTED BECAUSE IT HAS BEEN A PROVEN TECHNOLOGY. ALSO THE SYSTEM WILL HAVE SEVERAL COMPONENTS WHICH CAN ADDRESS THE VARIETY OF ORGANIC AND INORGANIC CONTAMINANTS. IF THE SYSTEM AS PROPOSED IS NOT AS EFFECTIVE AS REQUIRED BY STATE OR LOCAL STANDARDS, ADDITIONAL COMPONENTS CAN BE ADDED TO THE PROPOSED SYSTEM.

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STATUTORY DETERMINATIONS

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THE OPERABLE REMEDIAL UNITS SELECTED IN THIS ROD ARE CLEARLY AS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AS POSSIBLE AT THIS TIME SINCE PERMANENT DESTRUCTION OF ONSITE MATERIALS WILL BE CONDUCTED.

THE GOAL OF GROUNDWATER REMEDIATION WOULD BE TO MEET THE CURRENT DRINKING WATER STANDARDS FOR CHEMICAL SPECIFIED MAXIMUM CONTAMINANT LEVELS (MCLS) OR MAXIMUM CONTAMINANT LEVEL GOALS (MCLGS). AGAIN, SPECIFIC REQUIREMENTS MUST COMPLY WITH MCLS AT THE TIME OF REMEDIATION. SINCE THE GROUNDWATER REMEDIATION MAY TAKE UP TO 30 YEARS OR LONGER, THE AGENCIES WILL BE REQUIRED TO REVIEW THE EFFECTIVENESS OF THE EXTRACTION AND TREATMENT SYSTEM ON A PERIODIC BASIS. AT A MINIMUM THIS REVIEW SHOULD OCCUR EVERY FIVE YEARS. IN THIS REVIEW THE AGENCIES MUST CONSIDER THE REDUCTION OF CHEMICAL CONCENTRATIONS FOR EACH OF THE THREE ZONES OF GROUNDWATER AND POSSIBLY ALTER THE PLACEMENT OF EXTRACTION WELLS OR CONSIDER ANY BENEFITS FROM REINJECTION OF CLEANED AND TREATED WATER WHICH COULD SPEED UP OR HELP TO CONTROL THE RATE OF REMEDIATION.

ATTAINMENT OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

THE REMEDIES WILL MEET ALL ARARS FOR THE FEDERAL AND STATE GOVERNMENTS AND NO WAIVERS ARE REQUIRED AT THIS TIME.

LOCAL REQUIREMENTS MUST ALSO BE CONSIDERED IF THE LOCK HAVEN POTW IS USED FOR THE FINAL TREATMENT OF THE GROUNDWATER TREATMENT SYSTEM.

SOME OF THESE REQUIREMENTS WILL NEED TO HAVE SPECIFIC CHEMICAL STANDARDS AND WILL BE FURTHER DEFINED IN THE DESIGN STAGE WHEN THE PERMITTING REQUIREMENTS ARE MET.

THE FOLLOWING TABLE 3 PROVIDES A SUMMARY OF THE FEDERAL AND STATE ARARS. THE PRIMARY REGULATIONS OF CONCERN ARE RCRA REQUIREMENTS FOR INCINERATORS, AIR REQUIREMENTS FOR INCINERATOR EMISSIONS, AND NPDES REQUIREMENTS FOR DISCHARGE OR LOCAL SEWAGE PLANT PRETREATMENT REQUIREMENTS. ADDITIONAL REQUIREMENTS ARE OUTLINED HERE, BUT WILL NOT SUPERSEDE ANY NEW OR MORE STRINGENT REQUIREMENTS WHICH MAY BE IN EFFECT AT THE TIME OF SITE REMEDIATION.

TABLE 3

ACTION-SPECIFIC ARARS FOR OPERABLE UNITS A AND B

REQUIREMENT	RATIONALE
FEDERAL	
OSHA REQUIREMENTS (29 CFR, 1926 AND 1904)	REQUIRED FOR WORKERS ENGAGED PARTS 1910, IN ONSITE REMEDIAL ACTIVITIES
THRESHOLD LIMIT VALUES, CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS *	MAY BE APPROPRIATE FOR AIR AMERICAN CONCENTRATIONS DURING REMEDIAL ACTIVITIES
DOT RULES FOR HAZARDOUS MATERIALS TRANSPORT (49 CFR, PARTS 107, 171.1-5000	REMEDIAL ALTERNATIVES MAY INCLUDE OFFSITE TREATMENT AND DISPOSAL
CLEAN WATER ACT NPDES PERMIT REQUIREMENTS	REMEDIAL ALTERNATIVES MAY INCLUDE DISCHARGE OF EFFLUENT TO SURFACE WATERS.
HAZARDOUS WASTE REQUIREMENTS (RCRA SUBTITLE C, 40 CFR PART 264)	APPLICABLE TO TREATING, STORING, AND DISPOSING OF HAZARDOUS WASTES.
GENERAL PRETREATMENT REGULATIONS FOR EXISTING AND NEW SOURCES OF POLLUTANTS (40 CRF PART 403)	REMEDIAL ALTERNATIVES MAY INCLUDE DISCHARGE OF EFFLUENT TO POTW
FEDERAL MANIFEST FOR TRANSPORT OF HAZARDOUS WASTE (40 CFR, PART 262)	HAZARDOUS WASTES MAY BE TRANSPORTED OFFSITE
SAFE DRINKING WATER ACT UNDERGROUND INJECTION CONTROL REGULATIONS (40 CFR, PARTS 144,145, 146, AND 147)	MAY BE APPROPRIATE FOR DISCHARGE OF EFFLUENT TO UNDERGROUND WATERS FOR SOIL WASHING

TABLE 3 (CONTINUED)

REQUIREMENT	RATIONALE
STATE	
PENNSYLVANIA SOLID WASTE DISPOSAL REGULATIONS, PA CODE TITLE 25, CHAPTER 75	STANDARD FOR TREATING, SORTING, AND DISPOSING OF HAZARDOUS WASTES
PENNSYLVANIA POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) RULES, PA CODE TITLE 25, CHAPTER 92	REMEDIAL ACTIONS MAY INCLUDE DISCHARGE OF EFFLUENT TO SURFACE WATERS
PENNSYLVANIA WASTEWATER TREATMENT REQUIREMENTS, PA CODE TITLE 25, CHAPTER 95	REMEDIAL ACTIONS MAY INCLUDE DISCHARGE OF EFFLUENT TO SURFACE WATERS
PENNSYLVANIA INDUSTRIAL WASTE REGULATIONS, PA CODE TITLE 25 CHAPTER 97	REMEDIAL ACTIONS MAY INCLUDE DISCHARGE OF EFFLUENT TO SURFACE WATERS, OR UNDERGROUND WATERS IN THE CASE OF SOIL WASHING
PENNSYLVANIA SPECIAL WATER POLLUTION REGULATIONS, PA CODE TITLE 25, CHAPTER 101	APPLICABLE FOR PERMITTED SOLID WASTE DISPOSAL FACILITIES
PENNSYLVANIA AIR POLLUTION CONTROL REGULATIONS, PA CODE TITLE 25, CHAPTER 121 THROUGH 143	INCINERATION IS CONSIDERED A POTENTIAL REMEDIAL ACTION
PENNSYLVANIA STORM WATER MANAGEMENT ACT OF 4, 1978, ACT NO. 167	REMEDIAL ACTIONS MAY REQUIRE STORMWATER MANAGEMENT SYSTEMS
PENNSYLVANIA EROSION CONTROL REGULATIONS, PA CODE TITLE 25, CHAPTER 102	SOIL DISTURBANCES DURING PROPOSED REMEDIAL ACTIONS MAY REQUIRE EROSION AND SEDIMENTATION CONTROL MEASURES
PENNSYLVANIA HAZARDOUS SUBSTANCES TRANSPORTATION REGULATIONS PA CODE TITLE 25, CHAPTERS 121 - 143	APPLICABLE TO WASTE SHIPPED OFFSITE FOR ANALYSIS, TREATMENT, OR DISPOSAL

* CRITERIA, ADVISORIES, OR OTHER GUIDELINES TO BE CONSIDERED (TBCS)

COST EFFECTIVENESS

THE REMEDIES HAVE BEEN REVIEWED FOR THE COSTS AND ARE COST EFFECTIVE UNDER CURRENT TECHNOLOGIES.

UTILIZATION OF PERMANENT SOLUTIONS

THE REMEDIES USE PERMANENT SOLUTIONS FOR THE SOILS AND SLUDGES AND WILL ATTEMPT LONGTERM/PERMANENT TREATMENT FOR THE GROUNDWATER WHICH WILL REDUCE THE TOXICITY, MOBILITY AND VOLUME OF CONTAMINATED SLUDGES, SOILS AND GROUNDWATER.

UNDER CURRENT STATUES THE TEN YEAR PERIOD OF GROUNDWATER REMEDIATION WILL BE PART OF THE SELECTED REMEDY AFTER WHICH OPERATION AND MAINTENANCE WILL BEGIN.

IF REMEDIATION GOALS ARE MET, OR IF NO FURTHER BENEFIT IN THE EXTRACTION AND TREATMENT PROGRAM CAN BE OBTAINED, THE AGENCIES MAY AGREE TO DISCONTINUE THE GROUNDWATER REMEDIATION EFFORTS.

PREFERENCE FOR TREATMENT AS A PRINCIPLE ELEMENT

INCINERATION IS A TREATMENT WHICH CAN DESTROY THE COMPLEX CHEMICAL MIXTURES AT THE DRAKE CHEMICAL SITE AND WILL ASSURE THE AGENCIES THAT THE CONTAMINANTS FOUND IN THE RI WILL BE REMOVED FROM THE SITE.

THE GROUNDWATER TREATMENT IS ALSO A PROVEN TECHNOLOGY AND CONSTRUCTION OF THE MULTIPLE SYSTEMS WILL ALLOW ANY NECESSARY ADDITIONS TO ASSURE EFFECTIVE TREATMENT TO MEET DISCHARGE REQUIREMENTS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
POST OFFICE BOX 2063
HARRISBURG, PENNSYLVANIA 17120
SEPTEMBER 29, 1988

STEPHEN R. WASSERSUG, DIRECTOR
HAZARDOUS WASTE MANAGEMENT DIVISION
EPA REGION III
841 CHESTNUT BUILDING
PHILADELPHIA, PA 19107

RE: LETTER OF CONCURRENCE
DRAKE CHEMICAL SUPERFUND SITE, RECORD OF DECISION (ROD)

DEAR MR. WASSERSUG:

THE RECORD OF DECISION FOR PHASE III OF THE DRAKE CHEMICAL SUPERFUND SITE HAS BEEN REVIEWED BY THE DEPARTMENT.

THE MAJOR COMPONENTS OF THE SELECTED REMEDY, AS DESCRIBED IN THE RECORD OF DECISION, INCLUDE:

- EXCAVATION OF CONTAMINATED SLUDGE/SOILS/SEDIMENTS AND INCINERATION USING A TRANSPORTABLE, ONSITE, ROTARY KILN.
- PUMPING OF CONTAMINATED GROUNDWATER TO A TREATMENT SYSTEM UTILIZING BIOLOGICAL ACTIVATED CARBON.

I HEREBY CONCUR WITH THE EPA'S PROPOSED REMEDY, WITH THE FOLLOWING CONDITIONS:

- THE DEPARTMENT WILL BE GIVEN THE OPPORTUNITY TO CONCUR WITH DECISIONS RELATED TO THE DESIGN OF THE REMEDIAL ACTION TO ASSURE COMPLIANCE WITH STATE ARARS.
- EPA WILL ASSURE THAT THE DEPARTMENT IS PROVIDED AN OPPORTUNITY TO FULLY PARTICIPATE IN ANY NEGOTIATIONS WITH RESPONSIBLE PARTIES.
- THE DEPARTMENT WILL RESERVE OUR RIGHT AND RESPONSIBILITY TO TAKE INDEPENDENT ENFORCEMENT ACTIONS PURSUANT TO STATE LAW.
- THIS CONCURRENCE WITH THE SELECTED REMEDIAL ACTION IS NOT INTENDED TO PROVIDE ANY ASSURANCE PURSUANT TO SARA SECTION 104(C)(3).

THANK YOU FOR THE OPPORTUNITY TO CONCUR WITH THIS EPA RECORD OF DECISION. IF YOU HAVE ANY QUESTIONS REGARDING THIS MATTER, PLEASE DO NOT HESITATE TO CONTACT ME.

SINCERELY,

MARK M. MCCLELLAN
DEPUTY SECRETARY
ENVIRONMENTAL PROTECTION

**DRAKE CHEMICAL SITE
LOCK HAVEN, PENNSYLVANIA
FINAL
RESPONSIVENESS SUMMARY
SEPTEMBER 1988**

THIS RESPONSIVENESS SUMMARY DOCUMENTS PUBLIC CONCERNS AND COMMENTS EXPRESSED DURING THE PUBLIC COMMENT PERIOD. THE SUMMARY ALSO DOCUMENTS THE EPA'S RESPONSES TO THE COMMENTS AND CONCERNS THAT WERE RECEIVED. INFORMATION IS ORGANIZED AS FOLLOWS:

- 1.0 OVERVIEW
 - 2.0 SUMMARY OF COMMUNITY INVOLVEMENT
 - 3.0 SUMMARY OF COMMENTS AND RESPONSES REGARDING THE PHASE III FEASIBILITY STUDY
 - 4.0 OTHER CONCERNS AND RESPONSES
 - 5.0 REMAINING CONCERNS
- ATTACHMENT:

COMMUNITY RELATIONS ACTIVITIES AT THE DRAKE CHEMICAL SITE

1.0 OVERVIEW

THE PUBLIC COMMENT PERIOD FOR THE DRAKE CHEMICAL SITE BEGAN ON AUGUST 30, 1988, AND EXTENDED TO SEPTEMBER 28, 1988. TO FACILITATE COMMENTING, EPA BRIEFED COMMUNITY OFFICIALS IN A MEETING AT LOCK HAVEN CITY HALL AND HELD A PUBLIC MEETING AT ULMER PLANETARIUM, LOCK HAVEN UNIVERSITY OF PENNSYLVANIA, ON SEPTEMBER 7, 1988.

AT THE MEETING, EPA DISCUSSED THE PHASE III FEASIBILITY STUDY AND PRESENTED EPA'S PREFERRED REMEDIAL ALTERNATIVES. THESE ALTERNATIVES ADDRESSED CONTAMINATED SOILS, SLUDGES, SEDIMENTS, AND GROUNDWATER CONTAMINATED PRIMARILY WITH ORGANICS, INCLUDING FENAC; CHLOROBENZENE; 1,2-DICHLOROETHENE, AND A VARIETY OF OTHER ORGANICS ASSOCIATED WITH THE MANUFACTURE OF DYE. THE AGENCY RECOMMENDED ROTARY KILN INCINERATION OF THE SOILS, SLUDGES, AND SEDIMENTS AND DISPOSAL OF RESULTANT ASH ON THE SITE BY BACKFILLING, COVERING WITH CLEAN SOIL, AND THEN REGRADING AND REVEGETATING THE SITE. THE AGENCY'S PREFERRED ALTERNATIVE FOR GROUNDWATER REMEDIATION CONSISTS OF PUMPING GROUNDWATER AND TREATING IT WITH A BIOLOGICAL ACTIVATED CARBON PROCESS PRIOR TO DISCHARGING THE EFFLUENT TO LOCAL SURFACE WATERS OR TO THE PUBLIC SEWAGE TREATMENT FACILITY.

OFFICIALS OF THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES (PADER) REPORTEDLY GAVE A PRELIMINARY INDICATION THAT THE AGENCY'S PREFERRED ALTERNATIVES MAY BE ACCEPTABLE TO THEM IF AGREEMENT CAN BE REACHED REGARDING THE VOLUME OF MATERIALS TO BE EXCAVATED AND INCINERATED. LOCAL OFFICIALS SUPPORTED THE EPA'S PREFERRED ALTERNATIVES BUT STRONGLY RECOMMENDED THAT THE AGENCY CONSIDER EXPANDING THE MUNICIPAL SEWAGE TREATMENT FACILITY RATHER THAN BUILDING A GROUNDWATER TREATMENT PLANT ON-SITE. NO COMMENTS OR CONCERNS WERE EXPRESSED BY PRIVATE CITIZENS OR BY RESPONSIBLE PARTIES.

LOCK HAVEN RESIDENTS BECAME AWARE OF THE DRAKE CHEMICAL SITE AS EARLY AS 1962 BECAUSE OF NUMEROUS FIRES THAT OCCURRED AT THE SITE. LOCAL OFFICIALS HAVE INTERACTED CLOSELY WITH EPA AND PADER OFFICIALS SINCE A 1982 EPA EMERGENCY ACTION WAS CONDUCTED AT THE SITE, FOLLOWING THE 1981 CLOSING OF DRAKE CHEMICAL COMPANY. RESIDENT INVOLVEMENT PEAKED IN 1983 WHEN TWO CITIZENS, GROUPS WERE ACTIVE. IN EARLY 1983, THE RURAL DEVELOPMENT COMMITTEE, EXPRESSED CONCERN ABOUT SEVERAL ISSUES, BUT THE GROUP WAS NOT HEARD FROM THEREAFTER. THE SECOND GROUP, CLEAN (CITIZENS AND LABORERS FOR ENVIRONMENTAL ACTION NOW) WAS COMPOSED PREDOMINANTLY OF FORMER CHEMICAL COMPANY WORKERS AND THEIR FAMILIES, AND ITS PRIMARY GOAL WAS TO SECURE HEALTH SCREENING FOR FORMER DRAKE EMPLOYEES. AS A RESULT OF CLEAN'S EFFORTS, A TASK FORCE OF LOCAL DOCTORS, OFFICIALS, AND RESIDENTS WAS ESTABLISHED, IN 1983, TO ASSIST THE PENNSYLVANIA DEPARTMENT OF HEALTH (PADOH) TO CONDUCT A MEDICAL STUDY. CLEAN APPARENTLY BECAME INACTIVE IN LATE 1984 OR EARLY 1985. HOWEVER, FOLLOWING THE INITIAL HEALTH STUDY, THE CENTERS FOR DISEASE CONTROL (CDC), THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH), AND PADOH INITIATED A LONG-TERM STUDY OF OCCUPATIONALLY-EXPOSED FORMER DRAKE WORKERS. THE STUDY, FUNDED BY THE FEDERAL SUPERFUND PROGRAM, IS BEING CONDUCTED BY THE CENTER FOR ENVIRONMENTAL EPIDEMIOLOGY AT THE UNIVERSITY OF PITTSBURGH AND WILL EXTEND OVER A 5-YEAR PERIOD. THE UNIVERSITY REPORTS A SATISFACTORY LEVEL OF PARTICIPATION IN THE PROGRAM.

SEVERAL PUBLIC MEETINGS REGARDING THE DRAKE CHEMICAL SITE HAVE BEEN HELD SINCE 1982. OVER TIME, PUBLIC PARTICIPATION HAS DECREASED, ALTHOUGH LOCAL OFFICIALS HAVE REMAINED ACTIVELY INVOLVED, AND THE NEWS MEDIA HAS CONTINUED ITS INTEREST AND COVERAGE. IN ADDITION TO LOCAL OFFICIALS AND NEWS MEDIA REPRESENTATIVES, LESS THAN 20 RESIDENTS ATTENDED THE PHASE III PUBLIC MEETING ON SEPTEMBER 7, 1988.

VIRTUALLY ALL OF THE COMMENTS AND RESPONSES SUMMARIZED IN THIS SECTION WERE MADE DURING THE BRIEFING OF OFFICIALS ON SEPTEMBER 7, 1988. ONE COMMENT, INDICATED WITH AN ASTERISK (*), WAS REPEATED BY AN OFFICIAL AT THE PUBLIC MEETING ALSO HELD ON SEPTEMBER 7, 1988.

1. THE PRIMARY CONCERN EXPRESSED BY LOCAL OFFICIALS IS THE FINAL DISPOSITION OF GROUNDWATER EXTRACTED FROM THE SITE. IF EPA ELECTS TO SEND THIS WATER TO THE LOCAL SEWAGE TREATMENT PLANT, THE VOLUME OF WATER FROM THE DRAKE CHEMICAL SITE, COMBINED WITH THE VOLUME FROM THE ADJACENT AC&C FACILITY, MAY LOAD THE PLANT TO CAPACITY AND MAKE IT IMPOSSIBLE TO BRING IN ANY NEW INDUSTRIAL CLIENTS. OFFICIALS STRONGLY SUGGESTED THAT EPA CONSIDER EXPANDING THE CAPACITY OF THE MUNICIPAL PLANT, INSTEAD OF BUILDING A SEPARATE WATER TREATMENT FACILITY AT THE SITE. THEY SUGGESTED THAT IT MAY BE MUCH CHEAPER TO DO THIS AND SAID THAT THE LONG-RANGE BENEFITS TO THE COMMUNITY FROM THE MUNICIPAL FACILITY EXPANSION WOULD BE GREATER THAN THOSE DERIVED FROM A FACILITY BUILT ON SITE FOR RELATIVELY SHORT-TERM USE.

EPA RESPONSE: EPA HAS CONSIDERED BOTH THE OPTION OF BUILDING ITS OWN GROUNDWATER TREATMENT PLANT ON SITE AND DISCHARGING THE EFFLUENT INTO BALD EAGLE CREEK AND THE OPTION OF SENDING THE TREATED EFFLUENT TO THE MUNICIPAL SEWAGE PLANT FOR FINISHING. IF EPA ELECTS TO EXTRACT GROUNDWATER FROM ONLY ZONE 1, THE VOLUME OF WATER EXTRACTED WILL BE ABOUT 30 GALLONS PER MINUTE (GPM). IF GROUNDWATER IS EXTRACTED FROM ZONES 1 AND 2, THE VOLUME OF WATER EXTRACTED WILL BE APPROXIMATELY 60 GPM. EPA DOES NOT WANT TO IMPOSE ON THE EXISTING MUNICIPAL FACILITY AND PUSH IT TO CAPACITY. ONE ADVANTAGE OF THE PROPOSED ONSITE GROUNDWATER TREATMENT PLANT IS THAT THE SYSTEM CAN BE EXPANDED, AS NEEDED.

THE RECORD OF DECISION (ROD) WILL PROBABLY RECOMMEND EITHER BUILDING AN ONSITE GROUNDWATER TREATMENT AND FINISHING FACILITY OR TREATING THE WATER AT THE MUNICIPAL SEWAGE TREATMENT PLANT, DEPENDING UPON WHICH OPTION IS MOST SUITABLE AT THE TIME THE DESIGN IS DEVELOPED. THE ROD WILL BE WORDED TO LEAVE EITHER OPTION OPEN.

THERE ARE SOME ADVANTAGES TO USING THE MUNICIPAL FACILITY: EPA WOULDN'T HAVE TO SECURE DISCHARGE PERMITS OR MEET OTHER REQUIREMENTS AND EPA WOULDN'T HAVE TO MONITOR DISCHARGE ON A REGULAR OR LONG-TERM BASIS.

2. ANOTHER PRIORITY CONCERN FOR LOCAL OFFICIALS AND ONE WHICH HAS BEEN RAISED THROUGHOUT THE REMEDIAL PROGRAM, IS THE QUESTION OF PROPERTY OWNERSHIP AND FUTURE USE OF THE SITE. CITY OFFICIALS DO NOT BELIEVE THAT THEY SHOULD HAVE TO PURCHASE THE PROPERTY FROM THE COURT AFTER THE FEDERAL GOVERNMENT SPENDS MONEY TO CLEAN IT UP. THEY BELIEVE THE FEDERAL GOVERNMENT SHOULD TAKE STEPS TO MAKE IT POSSIBLE FOR SUCH PROPERTIES TO BE RETURNED TO LOCAL TAX BASES AND THAT THERE SHOULD BE SOME CERTIFICATION FROM THE AGENCY REGARDING THE SAFE FUTURE USE OF SUCH SITES. OFFICIALS POINTED OUT THAT MANY ACTIVITIES, SUCH AS WAREHOUSING, CAN BE CONDUCTED ABOVE GROUND, AND THE ABILITY TO USE THE PROPERTY COULD BE MEANINGFUL TO THE CITY IN THE FUTURE.

EPA RESPONSE: THE OWNERSHIP OF THE DRAKE CHEMICAL SITE WILL REMAIN IN THE BANKRUPTCY ESTATE. AFTER CLEANUP, THE ESTATE HAS THE OPTION TO SELL THE PROPERTY. INCINERATOR RESIDUALS ARE LIKELY TO BE PLACED ON SITE, AND THE AGENCY WILL CONSIDER THE SITE REMEDIATED FOLLOWING THE PROPOSED ACTIONS. THEREFORE, THE PROPERTY COULD BE USED, IF SOMEONE WANTED TO BUY IT. THE QUESTION IS WHETHER ANYONE WOULD ELECT TO PURCHASE THE PROPERTY, KNOWING THAT THERE WILL BE A 30-YEAR GROUNDWATER PUMPING AND TREATING PROGRAM IN PROGRESS AND THAT UNDER SARA THE NEW OWNER COULD BE HELD LIABLE, IF ADDITIONAL PROBLEMS ARE DISCOVERED.

3. OFFICIALS INQUIRED ABOUT THE PROJECTED REMEDIAL SCHEDULE AND WHETHER THERE WAS A WAITING PERIOD BETWEEN THE SOIL REMEDIATION AND THE GROUNDWATER REMEDIATION. ONE OFFICIAL SUGGESTED THAT A WAITING PERIOD MIGHT MAKE SENSE AS THE REMOVAL OF THE SOILS, IN ITSELF, WOULD POSSIBLY RESULT IN A DRAMATIC REDUCTION IN THE CONCENTRATIONS OF CONTAMINANTS IN THE GROUNDWATER.

EPA RESPONSE: THE EXCAVATION AND INCINERATION OF SOILS, SEDIMENTS AND SLUDGES WILL TAKE APPROXIMATELY 3 TO 5 YEARS, AND THE GROUNDWATER REMEDIATION WILL TAKE ABOUT 30 YEARS. THE 30-YEAR ESTIMATE WAS OBTAINED BY A COMPUTER MODEL USING THE GROUNDWATER FLOW RATE AND THE CONTAMINANT CONCENTRATIONS TO CALCULATE THE TIME NEEDED TO ACHIEVE DRINKING WATER STANDARDS. ALTHOUGH THE AQUIFER IN QUESTION IS NOT EXPECTED TO BE USED AS A DRINKING WATER SUPPLY, THE AGENCY DECIDED TO CONSIDER IT A POTENTIAL SUPPLY SOURCE. HOWEVER, IT IS POSSIBLE THAT THE DRINKING WATER STANDARD MAY NOT BE ATTAINABLE AT THIS SITE. CONSEQUENTLY, THE ROD WILL REQUIRE THAT THE GOALS FOR GROUNDWATER REMEDIATION BE REEVALUATED EVERY 5 TO 10 YEARS. GROUNDWATER PUMPING AND TREATING WILL OCCUR FOR AT LEAST 10 YEARS, IF NOT THE ENTIRE 30 YEARS CURRENTLY PROJECTED.

IT IS MOST LIKELY THAT GROUNDWATER TREATMENT AND EXCAVATION OF SOILS WILL BEGIN SIMULTANEOUSLY, ALTHOUGH IT WILL BE EASIER TO DESIGN THE PUMPING AND TREATING SCHEME THAN TO BRING IN AND SETUP THE INCINERATOR WHEN THE TWO TREATMENT SYSTEMS ARE OPERATIONAL, A DRAMATIC LOWERING OF CONTAMINANT CONCENTRATIONS WILL PROBABLY OCCUR. THE OVERALL PROJECT SCHEDULE WILL BE AFFECTED BY THE VOLUME OF MATERIALS TO BE EXCAVATED AND BY THE NUMBER OF GROUNDWATER ZONES TO BE PUMPED.

4. SEVERAL OFFICIALS WANTED TO KNOW HOW EPA IS GOING TO ESTABLISH THE EXTENT OF THE CLEANUP AND WHETHER THIS WOULD BE DETERMINED BEFORE OR AFTER THE RECORD OF DECISION (ROD).

EPA RESPONSE: THE EXACT EXTENT OF THE CLEANUP HAS NOT YET BEEN DEFINED. HOWEVER, THE EASIEST WAY TO ESTABLISH CLEANUP LIMITS WOULD BE TO SET THEM ACCORDING TO THE PHYSICAL BOUNDARY OF THE SITE. IT WOULD BE MORE DIFFICULT TO ESTABLISH CLEANUP LIMITS ACCORDING TO SPECIFIC CHEMICAL COMPOUNDS WHICH WOULD NECESSITATE FURTHER LABORATORY TESTING.

IT WILL BE DIFFICULT TO DETERMINE WHERE TO STOP EXCAVATING AT THE DRAKE CHEMICAL SITE, UNLESS A PHYSICAL LIMIT IS SET. KNOWING THE HISTORY OF THE ENTIRE VICINITY, MANY THINGS OCCURRED OVER THE LAST 50 YEARS THAT COULD CONTRIBUTE TO CONTAMINATION, BUT THERE IS A POINT WHERE CONTINUING TO EXCAVATE SOILS WILL CAUSE MORE DAMAGE THAN GOOD. ALSO, IT IS NOT THE INTENT OF THIS PROJECT TO KEEP EXPANDING INDEFINITELY TO WHATEVER EXTENT POSSIBLE, SPECIFIC CHEMICAL CLEANUP STANDARDS WILL BE TIED TO THE PHYSICAL LIMITS OF THE SITE BOUNDARY. AT THIS TIME, EPA IS PROPOSING TO EXCAVATE THE ENTIRE 12.5-ACRE SITE DOWN TO THE WATER TABLE AT A DEPTH OF 12.5 FEET. THIS REPRESENTS 240,000 CUBIC YARDS OF SOIL.

(AN OFFICIAL SUPPORTED THE IMPOSING OF A PHYSICAL LIMIT, SAYING THAT IT WAS IN THE CITY'S INTEREST, AS WELL AS THE EPA'S, TO SEE AN END TO THIS PROJECT.)

5. SEVERAL QUESTIONS WERE ASKED ABOUT THE TYPE OF FUEL THAT WILL BE USED TO POWER THE INCINERATOR, THE VOLUME OF ASH COMPARED TO THAT OF THE SOILS INCINERATED, AND WHETHER METALS IN THE ASH, OR AIR EMISSIONS FROM THE INCINERATION PROCESS, PRESENTED RISKS.

EPA RESPONSE: BECAUSE SOILS DO NOT BURN EASILY, FUEL WITH A HIGH BTU MUST BE USED THIS FUEL WILL MOST LIKELY BE NATURAL GAS WHICH IS AVAILABLE AT THE SITE. THERE WILL NOT BE A DRAMATIC REDUCTION IN VOLUME AS A RESULT OF SOIL INCINERATION; THE ASH WILL REPRESENT APPROXIMATELY 80% TO 95% OF THE SOIL VOLUME.

THERE WILL BE SOME METALS IN THE ASH. HOWEVER, THE SPECIFIC METALS THAT WOULD CONSTITUTE A HAZARD ARE NOT SIGNIFICANT AT THIS SITE. CADMIUM AND CHROMIUM ARE PRESENT BUT NOT IN HIGH CONCENTRATIONS. THE ASH WILL BE TESTED, AND IF METALS DO PRESENT A PROBLEM, THE ASH MAY HAVE TO BE SOLIDIFIED TO PREVENT THE METALS FROM LEACHING BACK INTO THE GROUNDWATER. ORGANICS ARE THE MAIN CONCERN, AND THEY WILL DEFINITELY BE DESTROYED BY INCINERATION.

AIR EMISSIONS FROM THE INCINERATOR ARE NOT LIKELY TO POSE A THREAT TO HUMAN HEALTH OR THE ENVIRONMENT. THE INCINERATOR UNIT WILL BE EQUIPPED WITH SCRUBBERS THAT WILL CAPTURE PARTICULATES IN THE SMOKE. THOSE PARTICULATES WILL THEN BECOME PART OF THE RESIDUE THAT WILL BE DISPOSED. THE INCINERATOR USED AT THE SITE WILL HAVE TO MEET THE SAME STANDARDS THAT ANY OTHER INCINERATOR MUST MEET -- 99.99% OF ALL SUPERFUND-LIST CONTAMINANTS WILL BE CAPTURED.

6. OFFICIALS WANTED TO KNOW WHETHER THE STATE IS IN AGREEMENT WITH EPA REGARDING THE PREFERRED REMEDIAL ALTERNATIVES AND WHAT THE STATE'S FUNDING OBLIGATION WILL BE, PARTICULARLY REGARDING THE LENGTHY GROUNDWATER REMEDIATION.

EPA RESPONSE: EPA HAS A PRELIMINARY INDICATION FROM THE STATE THAT THE EPA'S PREFERRED ALTERNATIVES ARE THE OPTIONS THE STATE WOULD RECOMMEND, ALSO. HOWEVER, THE STATE MAY NOT SEE THE NEED TO EXCAVATE THE ENTIRE SITE AND MAY PREFER INSTEAD TO DECREASE SOIL VOLUMES AND THUS DECREASE COSTS. LOOKING AT A LIST OF SITE-RELATED CONTAMINANTS, THE STATE FINDS THAT THE HIGHEST CONCENTRATIONS OF EACH OF THE CONTAMINANTS ARE FOUND IN CERTAIN AREAS THAT COMPRISE A MUCH SMALLER AREA THAN 12.5 ACRES. THE HEALTH-RISK FIGURES WILL HAVE TO BE REEVALUATED TO DETERMINE WHETHER THE SCOPE OF THE EXCAVATION CAN BE REDUCED.

EPA AND THE STATE WILL SHARE THE COST OF THE INITIAL REMEDIAL WORK, INCLUDING SOILS EXCAVATION, EXTRACTION WELL INSTALLATION, AND GROUNDWATER TREATMENT FACILITY CONSTRUCTION, ON A 90/10 BASIS. THE FEDERAL GOVERNMENT WOULD ALSO ASSUME 90% OF THE FIRST 10 YEARS OF OPERATION AND MAINTENANCE COSTS, WHILE THE STATE WOULD AGAIN ASSUME 10% DURING THE REMAINDER OF THE REMEDIAL EFFORT, THE STATE WOULD ASSUME 100% OF OPERATION AND MAINTENANCE EXPENSES. OPERATION AND MAINTENANCE FOR 20 MORE YEARS REPRESENTS AN ADDITIONAL \$1 MILLION THE STATE WILL BE REQUIRED OBLIGATE.

7. TWO OFFICIALS ASKED WHAT WOULD HAPPEN IF CLEANUP CRITERIA CHANGED DURING THE COURSE OF THE LONG-TERM REMEDIAL PROGRAM OR IF HOT SPOTS ARE DISCOVERED ON OR OFF THE SITE DURING THE CLEANUP PERIOD?

EPA RESPONSE: EVEN IF CLEANUP CRITERIA CHANGE, EPA'S GOAL WILL STILL BE TO A DRINKING WATER STANDARD. EPA MAY FIND, AFTER 10 YEARS, THAT THE KIND OF CONTAMINANT REDUCTION ANTICIPATED IS NOT OCCURRING AND THAT A DRINKING WATER STANDARD MAY NOT BE ATTAINABLE. THIS WILL HAVE TO BE EVALUATED OVER TIME.

IF HOT SPOTS ARE DISCOVERED WITHIN THE SITE AREA, EPA WILL PROBABLY HAVE THE FLEXIBILITY TO ADDRESS THEM, PARTICULARLY IF CHEMICAL STANDARDS ARE ESTABLISHED. IT PROBABLY WILL NOT BE POSSIBLE TO ATTEMPT TO REMOVE A HOT SPOT A MILE OR TWO OFFSITE AS PART OF THIS SITE REMEDIATION, HOWEVER.

8. AN OFFICIAL WANTED INFORMATION ABOUT THE DEPTH OF THE AQUIFER, WHETHER BEDROCK OR SOILS IN THE AQUIFER WERE CONTAMINATED, AND WHETHER THE SOILS IN THE AQUIFER WERE SAMPLED.

EPA RESPONSE: THE AQUIFER EXTENDS TO BEDROCK WHICH IS AT A DEPTH OF ABOUT 90 FEET IN MOST LOCATIONS EXCAVATION WILL NOT BE BELOW 12.5 FEET, AND ALTHOUGH THERE ARE CONTAMINATED SOILS IN THE AQUIFER, MOST OF THE CONTAMINANTS ARE IN THE UPPER PORTION OF THE AQUIFER. BEDROCK IS NOT A PROBLEM, AND IT WON'T BE NECESSARY TO PUMP GROUNDWATER FROM THE BEDROCK. EPA HAS TAKEN SOIL SAMPLES FROM THE WELLS. WHEN GROUNDWATER IS SAMPLED,

FILTERED AND UNFILTERED SAMPLES ARE COLLECTED. WHEN THE SAMPLES ARE FILTERED, THE SEDIMENTS SEPARATE AND ARE ANALYZED, JUST AS THE WATER IS ANALYZED.

9. ONE OFFICIAL INQUIRED HOW THE SITE WOULD BE AFFECTED IF A FLOOD OCCURS BEFORE THE CITY OF LOCK HAVEN BUILDS THE 200-YEAR LEVY SYSTEM IT IS PLANNING. (A 200-YEAR LEVY IS ONE CAPABLE OF WITHSTANDING A FLOOD OF A MAGNITUDE THAT STATISTICALLY SHOULD NOT OCCUR MORE THAN ONCE IN 200 YEARS.)

EPA REMEDIAL PLANS CALL FOR A DIKE TO BE CONSTRUCTED AROUND THE ONSITE INCINERATION FACILITY AND AROUND THE ONSITE GROUNDWATER TREATMENT PLANT SUFFICIENT TO PROTECT THEM AGAINST A 100-YEAR FLOOD. IF THE CITY'S 200-YEAR LEVY IS CONSTRUCTED BEFORE THE ONSITE TREATMENT FACILITIES ARE BUILT, EPA WILL GAIN SOME, FLEXIBILITY IN ITS PLANNING, BUT THE EPA'S REMEDIAL COST ESTIMATES ASSUMED THAT 100-YEAR DIKES WILL BE INSTALLED AROUND THE TREATMENT FACILITIES. (THE OFFICIAL REQUESTED THE ESTIMATED COSTS FOR BUILDING THE ONSITE DIKES. EPA FORWARDED THE INFORMATION IN A LETTER ON SEPTEMBER 19, 1988).

10. AN OFFICIAL INQUIRED ABOUT THE POSSIBILITY THAT THE LONG-TERM SOIL REMEDIATION WORK WILL CREATE JOBS FOR LOCAL RESIDENTS.

EPA RESPONSE: A LARGE COMPANY THAT OWNS A MOBILE INCINERATOR WILL COME IN AND WILL, MOST LIKELY, SUB-CONTRACT THE EXCAVATION WORK. HOWEVER, ANY CONTRACTORS HIRED WILL HAVE TO BE CERTIFIED UNDER THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) TO WORK WITH HAZARDOUS WASTES.

11. ANOTHER OFFICIAL ASKED IF THE PHASE III DESIGN WILL BE DONE BY THE CORPS OF ENGINEERS BALTIMORE DISTRICT?

EPA RESPONSE: THE DESIGN WILL BE DONE BY THE CORPS, OMAHA DISTRICT AND WILL BE IMPLEMENTED BY THE BALTIMORE DISTRICT. OMAHA WILL PREPARE THE BID SPECIFICATIONS, AND BALTIMORE WILL AWARD THE CONTRACT.

12. AN OFFICIAL ASKED HOW ONSITE UTILITY LINES WILL BE HANDLED DURING THE SOILS EXCAVATION.

EPA RESPONSE: THAT IS SOMETHING THAT CAN'T BE ANSWERED AT THIS TIME. IT WILL HAVE TO BE ADDRESSED DURING REMEDIAL DESIGN.

13. SEVERAL OFFICIALS REMARKED THAT THE PHASE III PREFERRED ALTERNATIVES ARE A SIGNIFICANT IMPROVEMENT OVER EARLIER PROPOSALS. THE FOLLOWING, CONCERNS AND RESPONSES WERE PRESENTED DURING THE OFFICIALS BRIEFING, SEPTEMBER 7, 1988:

I. ONE OFFICIAL REQUESTED AN UPDATE ON PHASE II WORK AND AN EXPLANATION OF WHY THE REMOVAL OF BUILDINGS 1 AND 2 WAS SEPARATED FROM THE REMOVAL OF OTHER SURFACE STRUCTURES AND DEBRIS SPECIFIED BY THE PHASE II ROD. THE OFFICIAL ALSO ASKED WHY THIS SEPARATION WAS NOT BROUGHT TO PUBLIC ATTENTION EARLIER.

THE PHASE II ROD, SIGNED IN 1986, SPECIFIED THE REMOVAL OF ONSITE BUILDINGS, LAGOONS, AND OTHER SCATTERED DEBRIS, AND IT WAS DETERMINED THAT THESE THINGS SHOULD BE REMOVED BEFORE THE FINAL PHASE III CLEANUP IS INITIATED. THE PHASE II REMOVAL IS NOW IN PROGRESS AND IS OCCURRING UNDER A NEW SUPERFUND INITIATIVE THAT REQUIRES THE REMOVAL PROGRAM AND THE REMEDIAL PROGRAM TO WORK TOGETHER MORE CLOSELY THAN REQUIRED PREVIOUSLY. THE DRAKE CHEMICAL SITE IS THE FIRST NATIONAL PRIORITIES LIST SITE IN REGION III AT WHICH EPA'S EXPANDED AUTHORITY UNDER SARA (SUPERFUND AMENDMENT AND REAUTHORIZATION ACT) HAS BEEN UTILIZED.

THE REMOVAL OF BUILDINGS 1 AND 2 WAS SEPARATED FROM THE REMOVAL OF OTHER SURFACE STRUCTURES AND DEBRIS BECAUSE OF THE RELATIVE COMPLEXITY INVOLVED IN REMOVING BUILDINGS 1 AND 2, AND ALSO BECAUSE OF THE CONTRACTUAL MECHANISMS OF THE REMOVAL AND REMEDIAL PROGRAMS. CONTRACTORS HIRED UNDER THE REMOVAL CONTRACT ARE PAID ON A TIME-AND-MATERIALS BASIS, WHEREAS CONTRACTORS FOR THE REMEDIAL PROGRAM ARE HIRED AT A FIXED PRICE. WHEN A PROJECT IS COMPLICATED, IT IS GENERALLY TO THE AGENCY'S ADVANTAGE TO HAVE A FIXED-PRICE CONTRACT.

THE SEPARATION OF THE PHASE II REMOVAL TASKS WAS NOT CALLED OUT AT THE TIME THE ROD WAS SIGNED BECAUSE EPA HAD NOT YET CONSIDERED DOING IT THAT WAY. THE GOALS OF THE ROD AND THE WORK INVOLVED REMAIN THE SAME, ALTHOUGH THE APPROACH TO THE WORK IS A BIT DIFFERENT.

REMOVAL ACTIONS ARE LIMITED BY STATUTE TO \$2 MILLION DOLLARS AND A 1-YEAR DURATION. AT DRAKE, ONE EXEMPTION TO THE STATUTE WAS GRANTED, BUT REGION III DID NOT HAVE ALL OF THE REQUESTED FUNDS IN ITS 1988 BUDGET. CURRENTLY, CONSIDERATION IS BEING GIVEN TO EXPANDING THE REMOVAL CONTRACTOR'S SCOPE OF WORK TO INCLUDE BUILDINGS 1 AND 2. THIS WILL REQUIRE ANOTHER EXEMPTION AND AUTHORIZATION OF ADDITIONAL FUNDS.

2. A NUMBER OF OFFICIALS COMMENTED THAT IF BUILDINGS 1 AND 2 REMAIN ON SITE, THE PUBLIC WILL NOT BELIEVE THAT REMEDIATION OF THE SITE HAS OCCURRED. THESE OFFICIALS BELIEVE THAT IT IS IN EVERYONE'S BEST INTEREST TO SEE THAT THE BUILDINGS ARE INCLUDED IN THE CURRENT REMOVAL ACTION AND SAID THAT IT IS IMPORTANT TO THEM TO GET PUBLIC RECOGNITION FOR THE WORK THAT HAS BEEN DONE.

EPA RESPONSE: EPA AGREES THAT THE PUBLIC WILL NOT PERCEIVE THAT THE WORK HAS BEEN ACCOMPLISHED IF BUILDINGS

1 AND 2 STAND, AND THEIR REMOVAL DURING THE CURRENT ACTIVITIES IS BEING CONSIDERED.

3. SEVERAL QUESTIONS WERE ASKED REGARDING WORK OCCURRING AT THE ADJACENT AC&C SITE WHICH IS CURRENTLY UNDERGOING A RCRA (RESOURCE CONSERVATION AND RECOVERY ACT) CLEANUP. OFFICIALS WONDERED IF THE AC&C AND DRAKE REMEDIAL PLANS WERE SIMILAR AND WHETHER AC&C'S PLANS CALL FOR INCINERATING SOILS TO THE EXTENT THAT SOILS WILL BE INCINERATED AT THE DRAKE CHEMICAL SITE. AN OFFICIAL SUGGESTED THAT, IF THE REMEDIAL PLANS ARE SIMILAR, THE TWO SITES MIGHT BE ABLE TO COOPERATE ON THE DEVELOPMENT OF TREATMENT FACILITIES.

EPA RESPONSE: BOTH AC&C AND THE DRAKE CHEMICAL SITE WILL USE ACTIVATED CARBON TO REMOVE ORGANICS FROM THE GROUNDWATER. THE AC&C GROUNDWATER TREATMENT SYSTEM WILL HAVE A SETTLING BASIN, BUT THE GROUNDWATER TREATMENT SYSTEM AT DRAKE WILL HAVE OTHER PRETREATMENT STEPS THAT WILL PRECIPITATE METALS IN THE GROUNDWATER AND THEN REMOVE ORGANICS. HAMMERMILL AND AC&C ARE BOTH LOCATED UPGRADIENT OF DRAKE AND SOME RESIDUAL GROUNDWATER FLOW MAY BE OCCURRING. HOWEVER, WITH AC&C TREATING GROUNDWATER ON ONE SIDE OF THE FENCE, UNDER THE STATE'S RCRA PROGRAM, AND EPA TREATING GROUNDWATER ON THE OTHER, AN EFFECTIVE GROUNDWATER REMEDIATION SHOULD OCCUR. EPA AND THE STATE WILL COOPERATE CLOSELY TO BE SURE THAT ALL THE CONTAMINATED GROUNDWATER IS BEING CAPTURED. AC&C ANTICIPATES BEGINNING ITS GROUNDWATER PUMPING AND TREATING OPERATION IN FALL 1988. PUMPING AND TREATING AT DRAKE WILL PROBABLY NOT BEGIN FOR ABOUT 2 YEARS, BUT THERE WILL PROBABLY BE SOME OVERLAP IN THE TWO PROGRAMS.

AC&C WILL NOT BE INITIATING A SOIL INCINERATION PLAN LIKE THE DRAKE CHEMICAL SITE INCINERATION PLAN. MOST OF THE SOILS FROM AC&C WERE ALREADY EXCAVATED AND REMOVED TO AN OFFSITE LANDFILL. WHAT REMAINS IS MORE OF A SLUDGE MATERIAL THAT CAN BE CONVERTED INTO A LIQUID SLURRY AND RUN THROUGH A CARBON ADSORPTION PROCESS. WHAT IS PRESENT AT THE DRAKE CHEMICAL SITE IS A MIXTURE THAT RESULTED FROM SLUDGE BEING CONTINUALLY COVERED WITH SOIL FOR THE PAST 20 YEARS.

CONCERNS NOT CONCLUSIVELY ADDRESSED DURING THE COMMENT PERIOD INCLUDE THE AFOREMENTIONED ISSUES:

1. USING SUPERFUND MONIES TO EXPAND THE MUNICIPAL SEWAGE PLANT, INSTEAD OF BUILDING AN ONSITE GROUNDWATER TREATMENT PLANT.
2. THE NEED FOR CHANGE IN THE FINAL DISPOSITION OF REMEDIATED SUPERFUND SITES, SO THAT THEY COULD BE RETURNED TO THE LOCAL TAX BASE WITHOUT THE MUNICIPALITIES INVOLVED HAVING TO PURCHASE THEM FROM THE BANKRUPTCY ESTATES.
3. THE NEED FOR A CHANGE IN SUPERFUND LEGISLATION THAT WOULD PROTECT PURCHASERS OF REMEDIATED SUPERFUND SITES FROM LIABILITY SHOULD HISTORIC PROBLEMS RE-EMERGE.

COMMUNITY RELATIONS ACTIVITIES AT THE DRAKE CHEMICAL SITE

COMMUNITY RELATIONS ACTIVITIES CONDUCTED TO DATE:

- EPA HELD A PUBLIC MEETING, IN SEPTEMBER 1982, TO DISCUSS SUPERFUND AND THE EPA EMERGENCY ACTION AT THE SITE. APPROXIMATELY 30 PEOPLE ATTENDED.
- EPA ESTABLISHED LOCAL INFORMATION REPOSITORIES IN 1982
- EPA HELD A PUBLIC MEETING, IN JANUARY 1983, TO DISCUSS THE REMEDIAL INVESTIGATION (RI) AND THE REMEDIAL ACTION MASTER PLAN (RAMP).
- EPA, PADER, NIOSH, AND CDC HELD A PUBLIC MEETING, IN MAY 1983, TO DISCUSS HEALTH ISSUES RELATED TO CONTAMINANTS ASSOCIATED WITH THE SITE. AT THE MEETING EPA PRESENTED A SLIDE SHOW COVERING PROPOSED RI/FS ACTIVITIES, AND NIOSH DISCUSSED THE BLADDER-CANCER RISK ASSOCIATED WITH BETA-NAPHTHYLAMINE (FENAC) EXPOSURE. THE MEETING WAS ATTENDED BY 250 FORMER DRAKE EMPLOYEES AND LOCAL RESIDENTS.
- EPA, PADER, NIOSH, AND CDC HELD A SECOND MEETING, IN MAY 1983, TO DISCUSS HEALTH ISSUES ASSOCIATED WITH THE SITE. MEDIA COVERAGE WAS EXTENSIVE AND INCLUDED A SPOT ON THE NATIONALLY TELEVISED CBS MORNING NEWS.
- EPA DISTRIBUTED A FACT SHEET ADDRESSING PUBLIC CONCERNS RAISED AT THE MAY 1983 MEETINGS.
- EPA HELD A PUBLIC MEETING, IN LATE 1984, TO DISCUSS THE PHASE I RI/FS.
- EPA HELD A PUBLIC MEETING, IN EARLY 1986, TO DISCUSS THE PHASE II RI/FS.
- EPA HELD A PUBLIC MEETING, IN SEPTEMBER 1987, TO DISCUSS THE STATUS OF PHASE II WORK AND THE PHASE III WORK PLAN. A FACT SHEET WAS PREPARED AND DISTRIBUTED AT THE MEETING
- EPA HELD A PUBLIC MEETING, IN SEPTEMBER 1988, TO DISCUSS THE PHASE III FS AND PROPOSED PLAN. COPIES OF THE PROPOSED PLAN WERE PREPARED AND DISTRIBUTED AT THE MEETING.